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Thirty-Hour Week Would Not Work in the Steel Industry

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OPPOSITION to the Black 30-hour week bill, recently passed by the United States Senate, is unanimous among operating executives in the steel industry. Although this objection arises to some extent from actual mechanical difficulties in the continuous production departments of the industry, the most serious criticism springs from the fact that the bill would impose drastic restrictions on the achievement of a purpose with which the steel industry has already been seriously concerned for more than two years. That purpose is the distribution of work and wages among as large a group as possible.

The Black measure, as passed by the Senate, prohibits the transportation in interstate commerce of any article or commodity produced or manufactured in any mine, quarry, mill, cannery, workshop, factory or manufacturing establishment in the United States in which any person, except officers, executives, superintendents and their personal and immediate clerical assistants, was employed or permitted to work more than five days in any week or more than six hours in any day. Perishable foods, agricultural and farm products processed for first sale by the original producer, and newspapers and periodicals are excepted. The measure would become effective 30 days after its enactment, and remain in force for two years.

The only relief offered from the definitely restrictive character of the bill is the provision that "upon the submission of satisfactory proof of the existence of special conditions in any industry included herein, making it necessary for certain persons to work more time than herein provided, the Secretary of Labor may issue an exemption permit in respect to such persons relieving the commodity from the provisions of the act." This provision might naturally alleviate difficulties in the steel industry considerably if properly interpreted.

Restrictive Principles Objectionable

Leaders in the steel industry are not disposed to concern themselves with the constitutionality of the Black measure. In fact, it is generally believed that the bill in its present form will not become a law. However, legislative approval of the principles contained therein seems rather certain, and even though the maximum number of hours of work per week may be increased from 30 to 36, the restrictive character of such legislation meets with considerable resentment.

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OPERATING executives in the steel industry sincerely hope that Federal legislation definitely limiting the working hours per week will not be passed. In interviews with a number of operating officials of long experience in the Pittsburgh district, the author of this article has summarized their objections and also attempted to point out the full significance of the proposed law to the steel business.

Of particular interest is the liberal attitude expressed toward the measure by steel company officials. Not one would oppose the bill if its enactment would alleviate unemployment or contribute to general business improvement. Their objections arise principally from the impracticability of applying restrictive measures to a continuous production industry which has been expending much time and money for more than two years in order to spread employment among as large a number of persons as possible.

The unquestionable purpose of the proposed law is the distribution of wages among as large a number of persons as possible, and this principle has been rigorously applied throughout the steel industry since late in 1930. The industry was one of the first to recognize its obligations to its employees, and has worked out the problem in a manner satisfactory to both labor and management. As an example, the average number of employees of the Jones & Laughlin Steel Corpn., Pittsburgh, was 20,765 in 1930, 23,441 in 1931, and 20,375 in 1932, despite a very sharp contraction in total payroll. The record of other large companies is probably just as impressive.

Under the circumstances the imposition of Federal restrictions at this time would prove confusing to labor as well as to management, and result in the addition to the payroll of an inconsequential number of workers. At the same time it might serve to further decrease the net wage of individuals already receiving a mere subsistence remuneration.

The Six-Hour Day in Finishing Departments

Further investigation through the Pittsburgh and nearby districts reveals the fact that many companies have already resorted to a 6-hr. working day in an effort to spread out employment. This plan has naturally been more adaptable to finishing mills than to primary operations, such as

the manufacture of coke, pig iron and raw steel, but the Weirton Steel Co., a fully integrated producer, now has fully 25 per cent of its employees on a 6-hr. basis. Some of the smaller sheet and tin plate making companies in the vicinity have been able to apply the 6-hr. principle even further.

The results have been entirely satisfactory so long as the discretionary powers of the management have been in full control. But any attempt to impose restrictions, particularly within a month's time, could not fail to disrupt the beneficial programs now in effect.

When the 12-hr. day in the steel industry was finally abolished, many companies had already inaugurated the 8-hr. principle. Continued objection to the shorter working period on the part of certain individuals in the industry possibly served to give the public an unfortunate interpretation of conditions at that time. In opposing present legislation looking toward an even shorter working period, executives of the industry are particularly anxious to emphasize the fact that their objections are not motivated by an unwillingness to cooperate in bringing about generally improved business or the betterment of labor conditions.

Continuous Production Hindered

In adjusting employment to a 30-hr. week, the most serious difficulties in the steel industry would naturally be encountered in the continuous production departments, such as the coke ovens, blast furnaces, open-hearth and Bessemer departments and blooming mills. The coke plant, for instance, must operate 24 hr. a day, seven days a week, if refractory linings are to be maintained at the proper temperature, thus eliminating costly replacements. Labor in the coke plant now works 8 hr. a day, six days a week, requiring a foreman for each of the three daily turns, and an extra man for the seventh day. Thus three foremen take care of 144 hr. in a 168-hr. week, with an extra man getting three turns. With a compulsory 30-hr. week the three foremen could work only 90 hr., and three more would be required for the additional 78 hr. Responsible men for these positions are actually not available, and the regular employees who have spent many years mastering their duties would seriously resent curtailment of their working time to 6 hr. a day, with a consequent 25 per cent reduction in net income.

The situation in the blast furnace department is rather similar. Three shifts are employed with a full crew for each turn. Most of these men are skilled or semi-skilled laborers, and are assured of employment so long as a blast furnace is in operation. When the furnace is blown out or banked, it is difficult to assign them different duties in other parts of the plant. If four shifts were used in operating the furnace, the number of men thrown out of employment by cessation of operations would naturally be increased, and the difficulties of placing them in other departments would be augmented.

Would Threaten Quality of Output

In the open-hearth and Bessemer departments the number of key men with both skill and experience is ever larger. The open-hearth furnace produces from two to three heats a day. With three shifts it is not always possible for a single turn to get out a heat. Changing turns during the heat divides responsibility for the quality of steel to be produced, and in these days of rigid specifications it is often difficult to turn out the desired material. An additional shift in this department would further increase the hazard and unquestionably add to the number of off heats produced. The actual financial loss involved is possibly not so important as the uncertainty occasioned and the time factor which enters into many of the rush orders that steel companies are called upon to fill.

The blooming mill is an important intermediate operation which also requires experienced labor. A change in turns while ingots are in the soaking pits, preparatory to break-down in the bloomer, is undesirable and prevented whenever possible. The actual operation of the blooming mill must not be interrupted if the flow of steel into the finishing mills is to be continuous. Although the subsequent rolling operations are sometimes supplied by stock billets and slabs, the lowest costs are obtained if semi-finished steel is delivered directly from the blooming mill to the finishing units, thus minimizing reheating. Under the circumstances, the blooming mill crew must be prepared to act quickly in all emergencies, and a change of shift when important repairs or adjustments are being made would be extremely undesirable.

The general service divisions of the steel mill, such as the power plant, water supply and repair departments, also require continuous attention. Electrical, steam and mechanical engineers must be subject to call at all emergencies, and must sometimes put in long periods of continuous work. On the other hand, mechanics may have little to occupy their time during the regular shift, and the financial burden of employing additional men experienced in work of such an intermittent nature could hardly be borne by the industry in normal times, much less in a period of depression.

Adoption of a 6-hr. day in finishing mills would not involve so many difficulties as in the other departments. Tin mills, for instance, have established sixteen 8-hr. turns as capacity operation for a week. It would easily be possible to fix capacity at twenty or twenty-one 6-hr. turns, providing additional men were available. Nevertheless, it would be necessary to train additional crews which would not be readily available under normal employment conditions. At present, of course, the additional men are easily secured, but immediate adoption of the 6-hr. principle would only serve to confuse job-sharing programs now in effect. An employee who was working three 8-hr. turns a week under present arrangements would merely work four 6-hr. turns instead at the same gross wage. Where mill operations are even lower, the rearrangement would be more difficult, if even partially economical schedules were to be achieved.

Supervisory Duties Increased

Addition of men to the payroll under current conditions, as well as at times of fairly steady production, would add greatly to the supervisory burdens of the modern steel plant. More clerical assistance would have to be attached to the offices of the superintendents and their assistants, in order to take care of payrolls, accident prevention work, order details and many other miscellaneous duties. Presumably many of these people would be excepted from the 30-hr. week limit, but present staffs would not be sufficient to handle the added details involved.

Clerical activities in steel company general offices would probably fall under the 30-hr. week limitation. The various departments would all be forced to expand their personnels in times of activity, but many of these jobs would unquestionably be dispensed with under depressed conditions. The necessary adjustments would work as a hardship on the "white collar" worker, whose position has been none too secure in the past, even though little attention has been paid to his plight. Engineers would be similarly affected, and their earning power reduced, particularly when engaged upon routine activities.

Accident Hazard Would Be Increased

The accident hazard would naturally be increased. Inexperienced men are always more of a risk than skilled workers, and a change of shift offers a much greater opportunity for injury than is occasioned in the regular operation of the mills. This would serve to increase the financial burden already carried by the steel industry in the form of hospitalization and compensation for injuries. In the same category is the pension factor. Addition of more workers, which would be necessary for operation on normal schedules, would increase the pension rolls without any definite compensating advantage to the employer. In large organizations, such as the United States Steel Corpn., where the pension burden is mounting yearly, this consideration is of real importance.

Further difficulties would be encountered by greater concentration of population in the smaller mill towns which are dependent almost entirely upon one or more large plants. Although additional workers would not be needed at present, they would be required as production returns to normal, with a resultant increase of 25 per cent in working population. In

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Advances in Die Making Result in Better Forgings

By GEORGE S. BRADY

TWO outstanding accomplishments in forging since the war have been the introduction of coining and the use of alloy steels in the dies. Neither of these are now new, but their final development during the period of depression has brought about a complete new phase in the steel forging industry, which previously had remained almost unchanged for half a century.

Production of super-accurate dies for the new industries of hot pressure molding and die casting has also had a radical effect on steel forging. Another important contributing factor has been the fact that the intense competition, due to overbuilt forging plants and to the tendency of designers to substitute the new alloy steel castings for forgings, has compelled the forgers to seek to produce superior work at lower cost.

Coining, which consists essentially in restriking the forging in powerful, rigid machines for finishing to size and to give a permanent cold set to the part, has demonstrated the importance of machine rigidity in the production of accurate forged parts. It is foolish to spend large sums of money on high-class dies if they are to be put into old-fashioned light machines, or machines that are badly worn.

Accurate Forgings Reduce Machining Costs

Since a very considerable part of the cost of a finished forging is the cost of machining and fitting, any accuracy that can be "built in" to the forged part to reduce machining costs will help to make the machine designer specify a forging instead of a casting. In some cases accuracies as close as 0.0005 in. are claimed for small-coined forgings, but 0.002 in. is common, and can be obtained without a special operation of coining if the forging machines are sufficiently rigid and the dies are of such a nature as to retain their shape and accuracy under the hot pounding. There is a tendency lately toward the powerful slow squeeze rather than the sharp blow. This operation of necessity requires a modern heavy press.

About one-third of the cost of a forging die is in the heat-treatment and the polishing after hardening. Moreover, the greatest "hazard" in a forging die is in the hardening, the shrinkage and warpage, making it very difficult to assure high accuracy even when the dies are made of the so-called non-shrinking steels. Hardened dies that have impressions of irregular shape are also likely to chip and crack when subjected to great changes in temperature. Reports from Russia regarding some of the first forging dies sent from this country to equip the new plants were to the effect that hardened dies exploded and broke into fragments when exposed to the intense winter cold. As a result, a large New England contract shop which furnished dies for the latest Russian tractor plant cut them from a nickel-chromium steel containing molybdenum and vanadium. This steel was received from the mill in blocks that had been fully heat-treated and had a hardness of about 350 Brinell.

Under the same conditions, those low-production dies that, for economic reasons, were made from carbon steel were cut and burnished with more than usual care because of the knowledge that even slight ridges, scratches or punch marks, or irregular drawing of the temper from forced grinding would be likely to cause cracks in the cold steel. The brittleness of steel increases rapidly with a decrease in temperature, especially if the steel has an initial high hardness.

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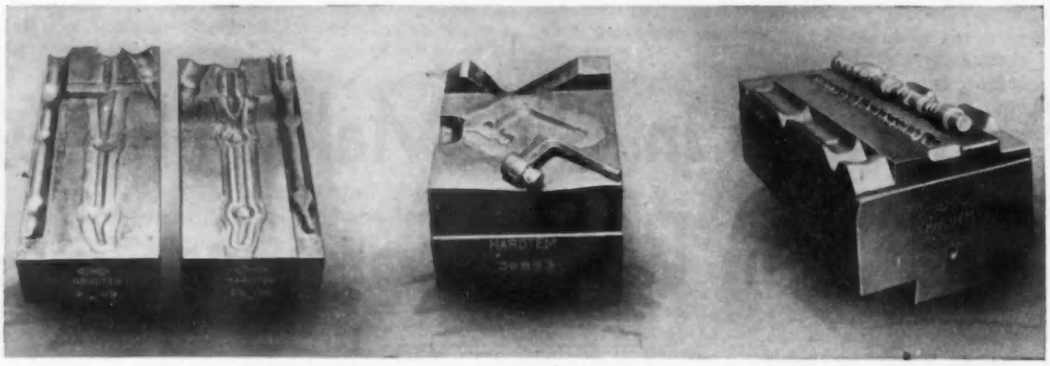
IMPROVEMENTS in forging dies and forgings, as brought about by experiences gained in making dies for pressure molding and die casting, as well as for drop forging, are outlined in this article. Alloy steels tempered to 310 to 360 Brinell have given excellent results without heat treatment after cutting. Both the die and the size and shape of stock are carefully planned before work on the tool is commenced. The net result is the production of steel forgings of such precision that machining is needed only on the finest fitting surfaces.

Nickel-Chromium Steels Employed

The alloy steels now employed for steel forging dies are usually nickel-chromium, or nickel-chromium with some molybdenum. These are either oil-hardening or air-hardening, and it is considered important to specify a steel that will harden from the lower ranges of temperature (1850 deg. F.) to avoid the trouble from scaling. These steels are fairly expensive, about 50c. a pound, but the original metal cost is usually small and incidental as compared with the cost of making the die; furthermore, the life of such a steel die is around ten times that of a carbon-steel die.

For low production runs the carbon-steel dies (carbon 0.60-0.65 per cent) are still the most economical, and if the run is only a few thousand and the design simple, these steels may be used in the "as forged" condition, without hardening. It is a waste of effort to harden carbon-steel dies if the shape and the rate of forging brings the temperature of the die above the tempering ranges. But where the rate of forging brings the temperature of the die face up to around 1000 deg. F., it is essential to employ alloy steels in the die. For very fast forging operations where the die is heated excessively, tungsten steels are used, but it must be remembered that tungsten steel will break easily on intricate dies. Making the face of the die of alloy steel and the heavy part of the block of a cheaper steel is sometimes economical. The dies for the Russian tractor and truck parts, mentioned above, were made from solid blocks of alloy steel, these blocks weighing from 800 to 1200 lb. each.

A company making many of these tools developed a new technique in the production of the dies from its recent experience with molding dies. As the new molding industry was not hampered by tradition to the extent of specifying and sticking to one type of die, it was possible to experiment, and it soon developed that a hard-tempered alloy steel (310 to 360 Brinell) gave excellent results without heat treatment after cutting. The extreme accuracy and high polish required in the molding dies led also to the same accuracy and finish in the



Forging dies made of alloy steels having a hardness above 300 Brinell and very accurately machined and finished are employed in modern practice. The camshaft and other automotive dies here shown are made of Hardtem steel. They are used in the "as machined" condition and do not require further hardening.

forging dies. A few years ago the cutting of dies having a hardness of 350 Brinell to the accuracies now obtained was considered impossible in the forging industry, but it was only necessary to show that what could be done with molding dies could also be done with forging tools.

Die Sinkers Called Upon to Work Very Hard Steel

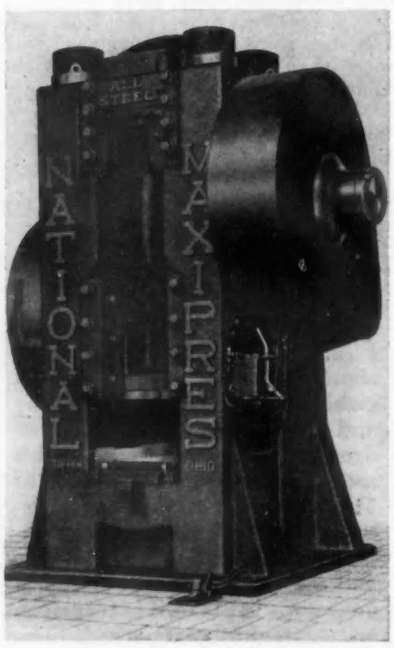
The die sinking is done with standard two-lipped cutters. High-speed steel or a super high-speed cobalt steel is employed, and the cutters run at fairly high speeds. A die sinker accustomed to the working of annealed steels must learn a new art in cutting steels having a hardness above 300 Brinell, and one die manufacturer maintains that this would not have been brought about easily if it had not been that the difficult situation of the depression period had made the workmen more patient and eager to advance new ideas.

From 0.007 to 0.008 in. is left in the die to chip or grind out or to remove with dental burrs as the shape of the impression permits. The chipping hammers are air-driven. The burnishing is then done with horsehide wheels, using emery or a hard abrasive for the rough polishing and rouge for the second operation. For molding dies no scratches or irregularities of any kind are permitted on the surface of the impression, and this same quality of workmanship is now demanded in all forging dies for particular parts. The result is that steel forgings can now be offered of such precision that machining is needed only on the finest fitting surfaces. Die making, however, has been removed from the old standard of a general jobbing tool room in the corner of the forge shop to a specialized industry in itself.

The expense of a highly accurate alloy-steel die has forced the planning of the entire job in advance, instead of the old practice of permitting a general die sinker to proceed with a die working from a model forging. The original cost of the metal alone in some of these dies amounts to several hundred dollars, and no errors of judgment or of workmanship are permissible if a profit is to be made on the contract. A layout of forging drawings, with an economic survey of the type of die and the machine to be used, has been found to pay. Specialized workmen then make up the necessary templets before the job is handed over to the die sinkers.

Tendency Is to Upset From Minimum Size of Bar

Advance planning includes the selection of the shape and size of stock best suited to produce the forging. This should not be left to the judgment of the die sinker, as has been the practice in many forging plants. The present tendency is to upset from a minimum size of bar rather than draw down from the maximum. Old forgers were afraid of "upset strains," but in a well-designed set of dies that permit correct flow of metal increased strength is actually produced by the upsetting. Attention to the flow in the die will also eliminate most of the flash previously considered inevitable.



In many cases the sizing of forgings by coining eliminates the necessity for subsequent machining. For this work, which has been termed "machining to size by pressure," rigid and powerful presses are required.

Another advance that has come through the experience of molding dies is the matter of chromium-plating the impression to give a hard wearing surface. The inserts for multiple-cavity molding dies are "hobbed" at temperatures around 2000 deg. F., and the finished inserts are then chromium-plated. This practice of plating is now employed effectively on forging dies, a plate of 0.002 to 0.003 in. being put on. Because of the poor throwing power of chromium special anodes must be made for every die in order to obtain an even plate of metal. The anodes are built up of sections to fit inside the die impression in such a manner as to assure the same solution space all around between anode and die cavity walls. Since the chromium is taken from the chromic acid solution of the plating bath, this equalization of the space between anode and die produces the even plate. Some of the built-up anodes for chromium plating are elaborate and fairly expensive, but it is the only way to obtain an even coat of metal under present plating methods.

A natural development resulting from the desire to avoid ordinary hardening troubles is the recent use of nitriding steels in the dies. But these steels are not suitable for as wide general utility as some seem to think. There is no economy in substituting them for alloy steels, but they appear to fit in best for dies for smaller runs where the production is fast enough to overheat the die. The nitrided steels will hold their hardness unaffected at temperatures up to 1000 deg. F., where hardened carbon-steel dies would lose their temper. The production from the nitrided die under these medium conditions will thus be considerably more than from a heat-treated carbon-steel die, but even under the most favorable conditions it will be about 25 per cent less than from an alloy steel die. The completed cost of a nitrided die will range about 25 per cent greater than that of a carbon-steel die.

Product Design and Its Influence on Set-up Time

By TELL BERNA
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THE problem of the designer is constantly growing more complex. In the design of machines, he must think of the function of each piece in the finished product so that the resulting machine will operate properly. In doing this, he must also carefully choose his materials and, with the wealth of new steel alloys and new kinds of cast iron that are now available, this choice is daily becoming more complex. Beyond that he must also select the proper heat treatment or hardening methods, bearing in mind the facilities available in his own shop as well as the service to which the piece must conform. He must select a suitable finish—for the question of general appearance has some effect on sales, and the sales department will be keenly interested to have an attractive looking product and to have it obviously strong enough for the service to which it is to be subjected, as well as strong enough from an engineering point of view. In high-speed machines, the questions of vibration and resonance must also have due attention, and it may be necessary to modify the design on this account.

Above all, the major consideration that remains beyond all these is how the piece is going to be manufactured in the shop and how it can be manufactured at the lowest possible cost.

Set-Up Time the Weakest Link

Every operation in the manufacture of a piece is important, and the weakest chain in the link is, of course, the most important. The department in the factory that gets the most attention is the one that shows the highest production cost and is most at fault in its methods. At present the idle time due to setting up is perhaps the weakest link in the chain in most of our shops and is the hardest element of cost to control. Excessive set-up time may mean loss on the final completed order although the methods used are entirely correct in every way. Under present competitive conditions every element of cost is doubly important and all of our accepted standards and methods must be subjected to searching analysis. It is no longer possible for us to continue with a method because it has been satisfactory in the past. It is not a question of whether or not the method gives us satisfactory results today; it is a question of whether we can find somewhere a better method, a quicker way, so that we can reduce our manufacturing costs.

Set-up time is particularly important on small quantities since obviously we cannot spend a great deal of time in studying each of these jobs. If a sufficient quantity is to go through the shop, we can enlist the assistance of the best brains in the organization to study every detail of how the work can be done. When quantities are small, as in a jobbing shop, this becomes a very difficult problem, and we find excessive variation in the time required to set up a job.

When quantities are small we cannot afford to resort to the special equipment, such as jigs, fixtures, etc., which we can readily provide when quantities are adequate.

Since it is unfair to expect the designer to be a compendium of all shop information in so complex and diversified a field, the design should be discussed with the pattern maker, the foundryman and the shop man before the drawings are sent into the shop. In altogether too many cases we are making up our drawings even to the finest detail and sending our blueprints into the shop only to have the suggestions and objections come in and require changes which could more readily have been made before the blueprints were issued. It is rare indeed that a change that has to be made by the pattern maker does not immediately upset the plans of the production man in the shop. The responsibility, therefore, rests on the designer to secure this information, to secure this criticism, to secure the suggestions from the production men, and above all, to act as umpire and make the decision between contending opinions.

The basic principle in design would be, therefore, to imagine the piece being made in the foundry and shop and the design for easy manufacture bearing in mind the equipment that is available and at hand. It is easily possible to find designs where a core is indicated and there is no method of holding the core in the foundry to prevent its floating out of place, or perhaps we have made no adequate provision for venting foundry gases. It is usual to resort to a locating point in the manufacture of the piece in the shop, but do we always advise the pattern maker what this locating point will be? The pattern maker and shop alike are allowed certain variations from dimensions, and if they figure their tolerances from the same locating point, we will secure an added economy in the use of our material and probably reduce the manufacturing time in the shop. Since the locating point is the important thing in setting up the piece for shop operation, it is obvious that there should be a definite understanding as to what it is.

Avoid Close Tolerances Not Required by Use of Part

A good deal of care and time in setting up could be eliminated if we avoid close tolerances that are not required by the use of the part. Tolerances are expensive, as we are becoming more and more aware, and expensive tooling and additional operations are frequently called for where, as a matter of fact, they are not necessary from the practical point of view. Sometimes we specify an extremely fine finish and an extremely accurate manufacture on dimensions where they are not required. On an automatic screw machine, for instance, instead

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IN this paper, presented at the Job Order Production Conference held by the American Management Association in Cleveland, April 13, Mr. Berna emphasizes the need of cooperation between the designer and the foundryman, pattern maker and shop man with a view to reducing idle time due to set-up, which, he states, is at present probably the weakest link in the chain of production operation. Avoiding of close tolerances and finishes not required by practical use of the part, provision of lugs and other mounting facilities, and consideration governing the use of jigs and fixtures are discussed. Use of the Chronolog, a new device for analyzing causes of idle time, is outlined briefly in connection with the study of set-up time.

of using a roughing and finishing forming tool which will run for hours without attention, we may have to resort to a roughing tool followed by a skiving operation, knowing that the skiving tool will not stand up as long and that the tooling will require constant attention.

On large castings it has long been standard practice to provide lugs or projections for conveniently chucking or mounting the piece when it is being machined. On some pieces, we may design the section heavier in order to avoid crushing when the piece is chucked for subsequent operations. We may have to provide lugs on pieces that will be chucked so that we can mill the piece without excessive chucking pressure. These are considerations that assist the shop tremendously in its set-up problem and they must be thought of in making the design.

We can sometimes arrange the holes in the piece to prevent the use of one box jig for drilling and boring operations instead of using a succession of jigs, each involving some set-up time.

In many cases, we can design our pieces for machining in a gang and sometimes we must substantially change the piece in order to make this possible. A slight change in shape, or the removal of a re-entrant angle may make it possible to polish a piece on an automatic machine instead of polishing it by hand.

Lugs, projections and locating points of this kind may be of such a nature that they must be removed after the machining operation, but the cost of removing them would be counterbalanced in many cases by the additional speed in setting up the piece on the machine.

Factors Governing Use of Fixtures

The question as to whether jigs and fixtures are justified for setting up a piece is, of course, one that requires careful planning and judgment, and it depends very largely on the quantities. It may be said, however, that even in small quantities, setting up fixtures are frequently justified. We are all familiar with the practice on planers where a piece is supported by a heterogeneous collection of blocks, straps, clamps, and washers, whereas if we mount the same piece on the table of a milling machine we provide a fixture to support it rigidly because of the pressure of the milling cutter. We could greatly improve the finish secured and the speed of setting up on our planers if we were more quick to realize that savings due to a fixture may be realized even in small quantities.

We may be compelled to change the design in order to simplify and cheapen the fixture. We may by skillful design be able to use the same fixture for several pieces of different size. It is often possible to provide a fixture for the table of a planer-type milling machine that will grip a piece in such a way that an assortment of sizes can be mounted by simply shifting one of these fixtures lengthwise on the table.

To sum up this angle of the problem, the question of when fixtures and jigs can be used depends entirely on the value of the set-up time that can be saved by their use, and in this connection, let us bear in mind that we sometimes spend a good deal too much time in tool rooms putting a high polish on a fixture without remembering that appearance has nothing to do with its value.

Piece Designed to Use Old Jigs

It is sometimes possible to use old jigs by designing the new piece so that, with the same locating and supporting points, the old jigs can be modified to save them. When this is done, however, we must remember that we will not be in position to manufacture economically if the old part is required on repair part orders. We are a little inclined to set prices on repair parts when the piece is being manufactured in suitable quantities and to let this price remain after the machine has become obsolete and the part is called for only in comparatively small quantities on repair part orders.

Just when we can afford to modify old patterns and old fixtures is a serious problem and, unless the old part is interchangeable with the new, it may be less expense to make a new fixture than to arouse antagonism among our customers by compelling them to pay for the manufacture of the old parts in small quantities and without the assistance of these manufacturing aids.

A change in design may make it possible to set up a piece in a gang, as in milling, gear cutting or polishing operations, and this is a possibility that the designer must bear in mind before the blueprint goes into the shop. This again is affected by the capacity of the machine, the length of the milling machine table, and the shop man must be called into consultation because it will be his duty to decide on what particular machine this job must be done.

After the design is completed the question of setting up on so many different types of machines and on so many different jobs makes the study and analysis of set-up time a rather complex affair. It can be simplified, however, by the use of the Chronolog,* a new instrument designed to analyze the causes of idle time in the shop. A Chronolog will give the superintendent and the manager of the plant a detailed record of every idle minute in the course of the day, including the time required to set up the job. We may not be able to study the job and to prescribe a given time in which it must be set up, but we can, by securing this record, make an analysis of the time required and, by comparing with similar jobs or with our own experience, decide whether or not that time is excessive. When set-up time becomes excessive, the Chronolog record gives such specific information that it is possible for the shop to take positive and constructive action to reduce the set-up time on the next order.

If we take as an example one of the worst conditions that the shop superintendent must contend with, we can assume a hobbing machine cutting gears in a jobbing shop. Sometimes the hobbing machine is set up on an entirely different shape and pitch of tooth than the last order; sometimes one gear blank must be cut and sometimes a hundred. With a Chronolog record, we can make a distinct record of the time required to set the hob on the machine, set it at the proper angle and put the pieces on the machine. We can then keep a definite record of the interruptions during the cutting of the gears themselves. We can then make a separate entry on the Chronolog record of the time required to remove the hob, return it to the tool room, clean the machine and get it ready for the next order. The data on this particular lot of gears can be kept entirely separate and the totals can be shown on the Chronolog record as an entirely separate item before beginning the next job.

We not only have the advantage of knowing how long it has taken to set up for this piece or this lot, but we also are bringing home to the set-up man, perhaps for the first time in his experience, the fact that idle minutes have a way of piling up with astonishing speed, and we can give him a realization which he has always lacked of the cost of setting up a machine on a job.

Delay by Others Also Shown

The set-up man himself or the operator is not the only one concerned with setting up a job. They are dependent on the services of the tool man, sometimes of the foreman and inspector. Sometimes the machine cleaner can delay the operation very substantially by failing to cooperate as he should. The Chronolog record makes provision for recording the visits of any or all of these men to the machine so that we can put our finger directly on the cause of delay instead of blaming it all indiscriminately on the operator, who has, of

course, no authority over these other men.

When such information has been secured on the Chronolog, there are a number of divisions in the company to whom the information is very important. We may have a cost accountant, a shop manager, a production manager and a timekeeper, all anxious to secure the same data. A good deal of the information that we are getting today in the shops would be of more value if we obtained it more quickly. If we take the Chronolog record and route through all of these departments, by the time it gets to the last one it loses a great deal of its value because it is not timely. It becomes then the basis of a post-mortem instead of a warning signal that can help us to avoid loss while the work is still in the shop.

To meet this requirement, provision is made on the Chronolog for printing what is called a Chronocard on which is summarized the same information that appears in the windows of the Chronolog and that appears on the last line of the Chronolog record. With this summary printed on the card, any number of which can be printed as desired, we can warn all of the departments concerned what progress is being made on the job, how our costs compare with the quotation we have made to our customer, and can insure prompt and vigorous action when action is required and excessive set-up time is indicated by this record.

On such information taken over a period of time, intelligent decisions as to appropriations for new machines, new fixtures and new equipment can be intelligently based, and we will have a check on the policies that must to some extent be taken for granted without these data.

*[Described in THE IRON AGE of Sept. 29, 1932, page 492—Ed.]

The "Sky Ride," a New Type of Long-Span Bridge

THE "Sky Ride" now being erected at the Century of Progress Exposition, Chicago, is a type of construction which may, because of its economy, come into rather general use in the place of bridges of standard design. A structure of this kind can be employed to handle ordinary pedestrian and vehicular traffic at a construction cost from one-tenth to one-twentieth of that which would be necessary to build a bridge of similar dimensions, it is stated. An important characteristic of this new type of structure is that the cost drops in proportion to the length of the span. The Sky Ride at Chicago is being built not merely as an amusement device, but also as a means of demonstrating the practicability of a new type of design for utilitarian purposes.

An outstanding feature of the Sky Ride is the design of a suspension system in which all members are tension members. The span is developed with ropes only, which produce a smooth, easy-riding span. The towers supporting the span are 628 ft. high. The span is 1850 ft., the horizontal cables being 200 ft. above the foundation. The span is exceeded only by that of the George Washington Bridge, New York.

The passengers will be carried in ten completely inclosed cars, each car accommodating 36 passengers, with the seating arrangement such that each individual has an unobstructed view of the fair grounds below and the surrounding countryside. The path of travel is approximately in a horizontal plane, in spite of the fact that no structural steel members are used to add stiffness to the suspended structure, and that, regardless of temperature changes and live load conditions, the cable stresses remain practically constant.

The upper backstays, extending from tower tops to anchors, are attached at the lower ends to fixed gravity anchorages, while the lower backstays are secured to rocker anchorages and are therefore counterweighted and under constant tension at all times. The upper or tower ends of all backstays are connected to the suspended system in the main span by tension members and the vertical forces of all cables are transmitted to the tower through suspended links, with the result that no horizontal forces of any appreciable magnitude are brought into the tower by the cable system.

This was another major consideration of design, for although the towers could safely react to these horizontal forces, it must be remembered that in each tower are two high-speed, heavy-duty passenger elevators serving the 600-ft. observation levels, and should the towers bend out of plumb beyond certain narrow limits, the smooth and uninterrupted operation of the elevators could not be assured.

The triangular portion of the system is in effect an 1850 ft. truss, wherein *each and every member is in tension*. There are no vertical cables, or what in a conventional suspension bridge would be called "suspenders." These have been replaced with diagonals, for it was found that under dead load only the diagonals remain taut; under the same conditions verticals would tend to slackness.

The sole function of the suspension system is to support the track cables and to hold them to the least practical deflection under live load. The greatest single unsupported span of track cable is 166 ft., and the maximum deflection under live load is 1½ per cent.

The construction of a Sky Ride with a span of 18,500 ft., using currently available materials only, would not be an especially difficult engineering feat. No special materials of any kind were used in the construction of the Chicago structure.

This design also demonstrates the practicability of welding in high tower construction. The twin towers connecting the span are the highest in which welding has been employed almost exclusively for steel fabrication. Welding has made for simplification of detail, economy of weight and speed in construction.

This project will cost slightly more than $1,000,000. It is being financed by the Otis Elevator Co., John A. Roebling's Sons Co., Mississippi Valley Structural Steel Co., the Inland Steel Co. and the Great Lakes Dredge & Dock Co.

Welding in the Steel Industry—Co

FABRICATION of water-cooled disk rollers for heating and annealing furnaces, as well as of common-type table rollers, finishing train rollers and transfer table rolls, is discussed briefly in this article, the first of a series of four by Mr. Taylor. Savings in weight and cost and the advantage of quick repair in case of damage are claimed for the welded designs.

A GOOD deal of attention has been paid in recent years to the construction of welded steel rollers, and the possibility of securing better balance, of speeding the work, and of effecting remarkable weight savings has led to the increased use of welded rollers.

A common type of rolling mill table roller is shown in Fig. 1. This is built up of a cylinder of standard pipe or seamless tube, depending upon the nature of the service. End-heads or hubs may be provided and welded into the ends of the cylinder as shown. The end-heads may be of single thickness plate welded into the cylinder end and welded or keyed to the shaft.

In the construction shown, a back weld is provided in the hub on the left end of the roller to serve as an anchorage for that end of the roller, as a second weld may not be provided on the inner surface of the hub unless the end-head is first assembled on and welded to the shaft and the cylinder then placed in position. A key is here shown for added strength, this being justified as a sliding fit keyway is provided in the hub on the opposite end of the cylinder to permit the roller to expand when coming in contact with hot steel. Since the shaft is in a cooler zone and expands less rapidly, the roller is permitted to expand freely over the shaft by reason of the sliding fit over the key. Where the cylinder and shaft work under the same temperature, welds may be provided at each end of the roller for fastening hubs to shafts.

If it is desired to construct an idler roller which requires no through shaft, but trunnions only, the trunnions may be made of short shafts terminating just inside the hubs.

Fig. 1.—Rolling mill table roller built up of standard pipe or seamless tube with end-heads or hubs welded into the cylinder.

Disk Rollers, Including Water-Cooled Type, Made by Welding

A disk roller for heavy plate is shown in Fig. 2. Since the disks expand more rapidly than the shaft, they should be closely bored for a shrink fit on the shaft. The edges of the bore should have been previously beveled so that combination back and outside welds may be provided to secure the disk to the shaft and to serve as sufficient metal section to convey heat from the disk to the shaft. The nature of the service and length of roller will, of course, determine the shaft diameter.

A water-cooled disk roller for use in a continuous heating or annealing furnace is shown in Fig. 3. Except for the pieces that form the sides of the composite disk, this entire roller is constructed of pipe of various sizes arranged and welded together in conjunction with the disk pieces. The cool water may enter at either end of the roller through the smaller pipe and leave at the opposite end through the same pipe, which is so blanked at the outlet end as to serve as both an inlet and outlet pipe.

The cool water is caused to flow around in the disk compartment as shown in section A-A. The partition welded on the inside of the disks

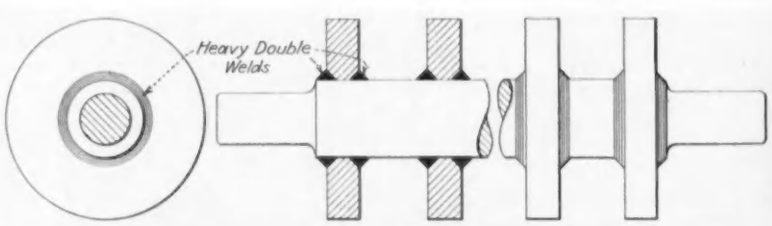


Fig. 2.—Plate or blooming mill disk-type table roller.

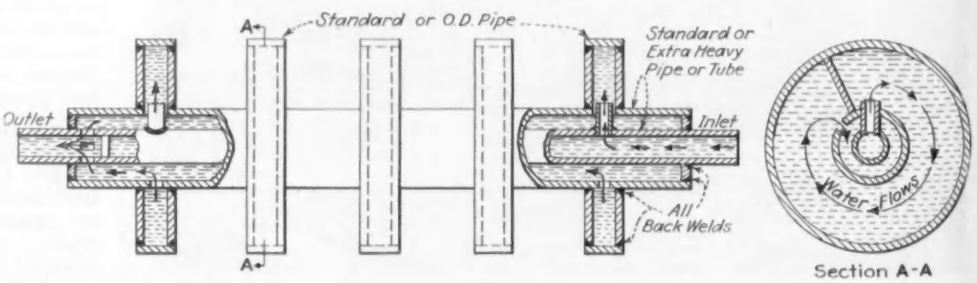


Fig. 3.—Water-cooled disk roller for continuous heating or annealing furnaces. Except for the pieces forming the sides of the disks, the entire roller is made up of pipe of various sizes, welded together as shown. Flow of cooling water around the disk compartment is pictured in section A-A.

Construction of Welded Steel Rollers

By C. M. TAYLOR
Vice-President
Lincoln Electric Co., Cleveland

causes the cooling water to flow a longer distance from inlet to outlet than if no partition were provided.

The usual glanded or swivel connections, not shown here, must of course be provided at each end of the roller. It should be noted that all welds shown are back welds in order that the thickness of all metal sections throughout the entire construction are equal and uniform.

Weight Saved and Cost Lowered

In Fig. 4 are shown four table rollers built at the Canton, Ohio, works of the Republic Steel Corpn. These differ somewhat from the construction just described. They consist of 10-in. O.D. pipe, 1 in. thick, with four supports at each end, the latter holding a block 4¾ in. in diameter and 2¾ in. thick in place. After welding the blocks were drilled and machined to receive the shaft and bearings.

Three smaller rollers were also constructed in the Republic shops for the finishing train. These are 6⅝ in. in diameter with the hub held in place by four ⅞-in. diameter rods, which were welded as shown in Fig. 5. The total weight of these seven rollers was 1226 lb., while that of similar cast rollers is 1928 lb. It was estimated that 38 per cent of the cost was saved by the welded construction. All welding was done by the shielded arc process using Fleetweld electrodes and equipment manufactured by the company with which the writer is connected.

Several transfer table rolls built by another Eastern mill are shown in Fig. 6. These have a roll surface speed of 105 ft. to 300 ft. per min. They are made up of steel pipe, roller bearings, forged roller shaft and gear—a casting in each end. The steel pipe is 15 in. in outside diameter, 13¾ in. inside diameter and ⅝ in. thick. Each end of steel pipe is beveled, allowing ½ in. space at bottom of the Vee to arc weld to the casting. The inside of the steel pipe is machined to a depth of 6 in. Both end castings that hold the roller shaft are machined to a shrink fit and inserted into the end of the pipe and welded.

It is obvious of course that rollers built of welded construction can, in case of damage, be repaired quickly by welding.

For much of the material in this article the author is indebted to George B. Cramp, Lukens Steel Co., Coatesville, Pa., F. F. Copeland and T. E. Copeland, Carnegie Steel Co., Munhall, Pa., C. A. Thayer, Leonard Larson and J. D. Donovan, Republic Steel Corpn., Massillon, Ohio.

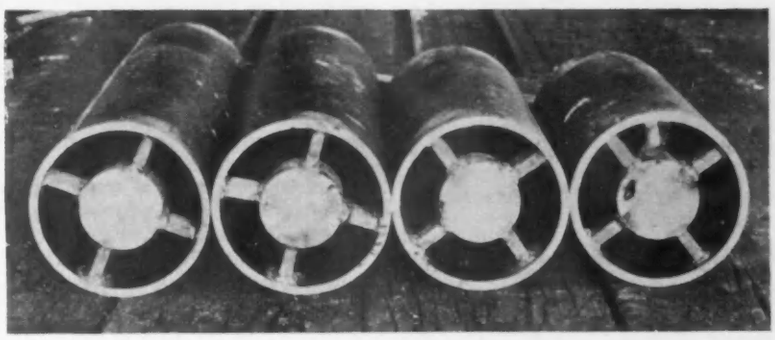


Fig. 4.—Welded table rollers made up of 10-in. O.D. pipe, 1-in. thick. After welding, the block held by the four supports was drilled and machined to receive the shaft and bearings.

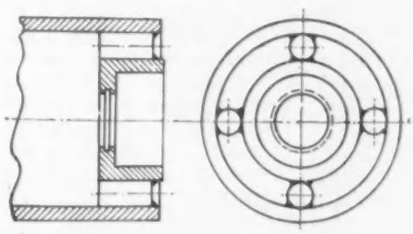


Fig. 5.—Construction of finishing train roller. The hubs are held in place by four ⅞-in. diameter rods, welded as shown.

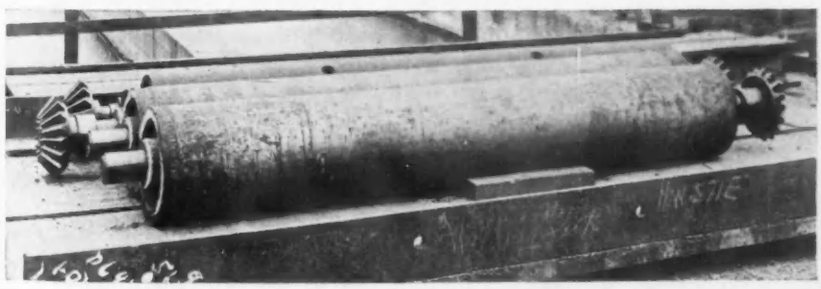


Fig. 6.—Transfer table rolls made up of steel pipe, roller bearings, forged roller shaft and gear and a casting in each end. The ends of the steel pipe are beveled, allowing ½-in. space at the bottom of the Vee to arc weld to the casting.

Would Insulate Furnace Walls

Insulation of furnace walls was advanced by J. H. Wright, in a paper presented before the Cleveland Institute of Engineers, at Middlesbrough, England, as a worthwhile means of effecting savings. A 3-in. firebrick top covered with 2½ in. of diatomite brick was found to be a better heat saving combination than a top of 12 in. of firebrick. In general he maintained that heat losses by conduction, radiation and convection may be reduced 50 to 70 per cent against the uninsulated wall loss without using great thicknesses of insulation. In certain cases, he added, this may mean a fuel saving of over 15 per cent. He admitted that insulation in the absence of efficient furnace temperature control renders the wall more liable to overheating and also that insulating materials themselves are generally weak and friable.

What the Machine Has Done to Us

By WALTER S. GIELE

THE wage earner's real reward is measured not by his dollar wage but by the relative quantities of goods and services that dollar wage can command. To appraise any real advantage that may have come to the wage earner through mechanization or coincidental with mechanization his real reward must be considered with respect to his productivity.

Charts 31 and 33 developed the productivity of the wage earner in terms of the physical equivalent of value added by manufacture per wage earner and per horsepower for each wage earner.

Chart 36 combines these values with the respective values of the real wage. The results derived from computing real wage on the basis of wholesale prices are connected by a full line on these charts merely because they form the longer of the two series and not because they are considered to be the more reliable. Results derived from computing real wage on the basis of cost of living are shown by points for convenience of comparison.

Reward Relative to Physical Output

The real reward of the wage earner with respect to his productivity (curves C and D) has not varied so much as might perhaps have been expected over a period long enough to have included most of the history of mechanization in the manufacturing industries. The maximum rate of change appears to occur at the beginning of the period, at which time it is probable that the apparent change has been distorted and exaggerated by the character of the data.

That the real reward of the wage earner with respect to the physical productivity has experienced a comparatively rapid change during the period 1919 through 1931 is significant. The values derived from cost of living data are probably the more reliable in this respect and show the more marked movement.

Whether or not this represents an inequitable loss to the wage earner depends on its cause. Is the value of the ratio reduced by reduction in numerator or increase in denominator?

Reward Relative to Power

The reduced real reward to the wage earner per unit of physical productivity does not demand increased effort on his part. It results from the increased productivity that has followed the progress of mechanization and is more marked in the period 1919 through 1931 because of the improved efficiency in the application of mechanization. This is revealed by the course of curves A and B of Chart 36 showing real wage for each horsepower unit of physical productivity. The downward course of C and D is offset by the simultaneous upward course of A and B.

Consideration of dollar wages per dollar value of product and per dollar value added by manufacture furnishes collateral evidence with respect to the reward the wage earner has received coincidentally with the development of mechanization rather than because of mechanization.

Chart 37 depicts these relations. Wages per dollar value of product and wages per dollar value added by manufacture have varied surprisingly little over this long period.

This is the wage earner's share of the sales dollar and the wage earner's share of the gross compensation received by the manufacturer for fabrication. It matches instantaneous values dollar for dollar. Thus it is unaffected by the changing price level and undistorted by lack of accuracy in determining precisely representative index series.

The period covers substantially the whole history of the amazing industrial development of the nation. During its course value of products has grown from a billion dollars in 1849 to more than 70 billion in 1929; value added by manufacture from less than half a billion in 1849 to substantially 32 billions in 1929; numbers of wage earners from less than one million to nearly nine million; and horsepower capacity installed from probably less than one million to 43 million. The country has fought external wars and has been rent by internal strife; it has seen recurrent waves of prosperity and of devastating depression.

In 1849 the wage earner sweat from dawn to dark for 23.25c. of the sales dollar of his product. In 1929 he worked in a modern factory for 16.66c. of the sales dollar. For the present century, as far as data are available, with all of its development, the change has been from 17.55c. in 1899 to 17.48c. in 1931.

HOURS PER STANDARD WORK WEEK AND WAGE RATES—MACHINISTS PER WEEK

Year	Hours			Wages		
	High	Low	Average	High	Low	Average
1849	84	60	68.0	$15.00	$6.00	$9.00
1859	78	60	64.0	18.00	6.72	9.78
1869	66	60	62.0	30.00	6.00	15.72
1879	60	59	60.0	38.34	5.52	12.54
1889	60	59	60.0	30.00	6.00	13.56
1899	54	54	54.0	18.90	8.10	14.04
1904	..	..	54.3	....	....	15.53
1909	..	..	54.0	....	....	18.00
1914	..	..	50.0	....	....	21.00
1919	..	..	44.0	....	....	35.20
1921	..	..	44.0	....	....	39.60
1923	..	..	44.0	....	....	40.92

Source—U. S. Bureau of Labor Statistics Bulletin No. 499.

MISCELLANEOUS DATA ON HOURS AND WAGES (OTHER THAN MANUFACTURING INDUSTRIES)

Per Week

Year	Bricklayers		Carpenters		Miners		Railroad Employees (Steam)		Railway Employees (Street)			
	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages
1849	60	$11.28	62	$10.44	..	....	..	....	..	....	..	....
1859	60	10.80	60	11.40	..	....	..	....	..	....	..	....
1869	60	29.28	60	19.78	..	....	..	....	..	....	..	....
1879	58	18.78	56	17.40	72	....	..	....	108	....	..	....
1889	51	24.18	51	18.84	..	....	..	....	..	....	..	....
1899	47	21.00	51	12.84	..	....	90	....	..	....	..	....
1904	44	28.60	44	23.32	..	....	..	....	..	....	..	....
1909	44	30.80	44	27.50	..	....	..	....	..	....	..	....
1914	44	33.00	44	27.50	..	....	..	....	..	....	..	....
1919	44	38.50	44	33.00	..	....	..	....	..	....	..	....
1921	44	55.00	44	49.50	..	....	..	....	..	....	..	....
1923	44	66.00	44	49.50	..	....	..	....	..	....	..	....
1925	44	66.00	44	57.77	..	....	..	....	..	....	..	....
1927	44	77.00	44	66.00	..	....	..	....	..	....	..	....

From U. S. Bureau Labor Statistics Bulletin 499.

Interrelations and Conclusions

THIS is the eighth and concluding article in Mr. Giele's series on the effects of mechanization. In this chapter he deals with the interrelations of the various factors which have been presented individually in previous installments.

The Iron Age considers itself fortunate in having been able to present to its readers, in Mr. Giele's work, a factual study of the relation of mechanization to wages, employment and investment which is perhaps more fundamental and thorough than anything similar previously attempted.

We believe that this series will form the basis for the intelligent decision of many previously debatable questions of present day and future importance and that a careful review and study of its chapters will well repay those of our readers who have felt the need of non-speculative light upon the relation of man to the machine.

More important for the purposes of the present discussion is the wage earner's share of the gross compensation received by the manufacturer for fabrication. In 1849 the wage earner, toiling long hours with almost no mechanical assistance and supplying most of his own tools, received in wages 51.10c. of every dollar of gross compensation for fabrication. In 1929, supplied with every modern tool and facility of production and equipped with four to five horsepower to lighten his labor and shorten his hours, he received 36.63c. For the present century, as far as data are available, the change has been from 41.46c. in 1899 to 36.30c. in 1931. Thus fully has the wage earner enjoyed the fruits of his increased productivity.

During the 32 years 1899 to 1931 average physical productivity per wage earner (on basis of value added by manufacturer) has increased as 1.000 is to 2.135 (19630 to 41900, Chart 31). This has been made possible by reason of increased facilities supplied by other than the wage earner as 1.000 is to 3.215 (2.145 to estimated 6.900, Chart 20). During that same period his real wage has increased as 1.000 is to 1.304 (77.5 to 101.0, Chart 18). Yet he has relinquished but 5 per cent of the sales dollar to gain this advantage—12.4 per cent of his share (36.30 ÷ 41.46).

Distribution of Value Added by Manufacture

In Chart 38, which shows the distribution of value added by manufacture with respect to wages and salaries, the same phase of the question is shown from another angle. Salaries shown are those paid for supervision of production processes only. Salaries of central administrative office employees are not included. The relative growth of these production salaries, therefore, reflects, in effect, a refinement in the division of labor and the total "wages plus salaries" represents an item which in the earlier stages of industrial development was almost wholly covered by wages alone.

The indicated downward trend for the more recent years follows in direction the indicated trends for the same period, as shown in Charts 36 and 37, reflecting the provision of increasing production facilities, that is, mechanization.

It has been held that the diversion of part of the proceeds of production to items other than wages has contributed to disemployment. Those who so hold admit that real wages have increased for those remaining at work, but contend that aggregate wage disbursements are no longer sufficient to absorb the increasing volume of production and thus lead to disemployment through restriction of market. Recent developments would seem to support this point of view. With respect to manufacturing industry the position would be sound if wage earners in manufacturing industry constituted the sole market for the products of manufacturing industry.

The Expanding Market for Manufactured Goods

Chart 39 shows, however, that the numbers of prospective buyers of manufactured goods are expanding more rapidly than are the numbers of persons occupied in manufacturing. Thus in 1870, for every 100 persons gainfully occupied in manufacturing there were 196 persons engaged in non-agricultural pursuits compelled to satisfy most of their wants, except food, from the products of manufacture. By 1930 that number had grown from 196 persons to 223 persons.

A profound change in the buying habits of those engaged in agriculture also took place during this interval. The average farm of 1870 was, in large measure, a self-contained unit producing most of what it used. The farmer of today is buying a larger proportion of manufactured goods of every sort. He is eager to buy more and would if relative prices of agricultural products permitted him to do so.

The Relations Between Hours of Labor and Wage Rates

Most discussions of hours of work and of wages have centered about questions of the number of hours in the nominal standard work week and of the rates of wage per hour. The wage earner is primarily concerned, however, with the total yearly earnings out of which he and his dependents must live. In times of prosperity the question, to a considerable degree,

HOURS PER STANDARD WORK WEEK AND WAGES IN MISCELLANEOUS MANUFACTURING INDUSTRIES

Per Week

	Bakers		Boiler Makers		Blacksmiths		Cotton Mill Hands		Laborers (General)		Molders (Foundry)		Puddlers		Rollers		Shoemakers	
Year	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages	Hrs.	Wages
1849	..	....	60	....	78	....	84	....	60	$5.64	72	....	..	$18.00	60	$17.28	..	....
1859	..	....	..	....	..	....	..	....	60	6.24	..	....	..	14.04	60	18.00	60	$18.00
1869	..	....	..	....	..	....	..	....	60	9.18	..	....	..	26.88	60	27.00	60	15.00
1879	112	$9.90	..	....	..	....	..	....	58	7.62	..	....	63	20.34	61	16.86	63	7.86
1889	120	18.69	..	....	..	....	..	....	61	8.46	..	....	59	19.14	60	30.78	48	6.00
1899	65	16.82	..	....	..	....	..	....	60	9.00	..	....	..	21.00	60	....	60	12.00
1904	61	16.67	..	....	..	....	..	....	..	....	..	....	57.9	21.65	62.2	44.42	..	....
1909	74	18.00	..	....	..	....	..	....	..	....	..	....	..	....	66.9	67.84	..	....
1914	54	20.00	..	....	..	....	..	....	..	....	..	....	51.4	26.42	61.7	57.13	..	....
1919	51	26.00	..	....	..	....	..	....	..	....	..	....	51.4	74.22	..	....	..	....
1921	48	47.00	..	....	..	....	..	....	..	....	..	....	51.8	82.25	58.9	99.60	..	....
1923	48	47.00	..	....	..	....	..	....	..	....	..	....	46.8	37.21	51.4	87.40	..	....
1925	48	47.00	44	....	..	....	..	....	..	....	44	....	47.9	58.92	51	89.56	..	....
1927	48	47.00	..	....	49	....	50	....	..	....	..	....	..	....	..	....	..	....

Miscellaneous data on hours and wages from U. S. Bureau of Labor Statistics Bulletin No. 499.

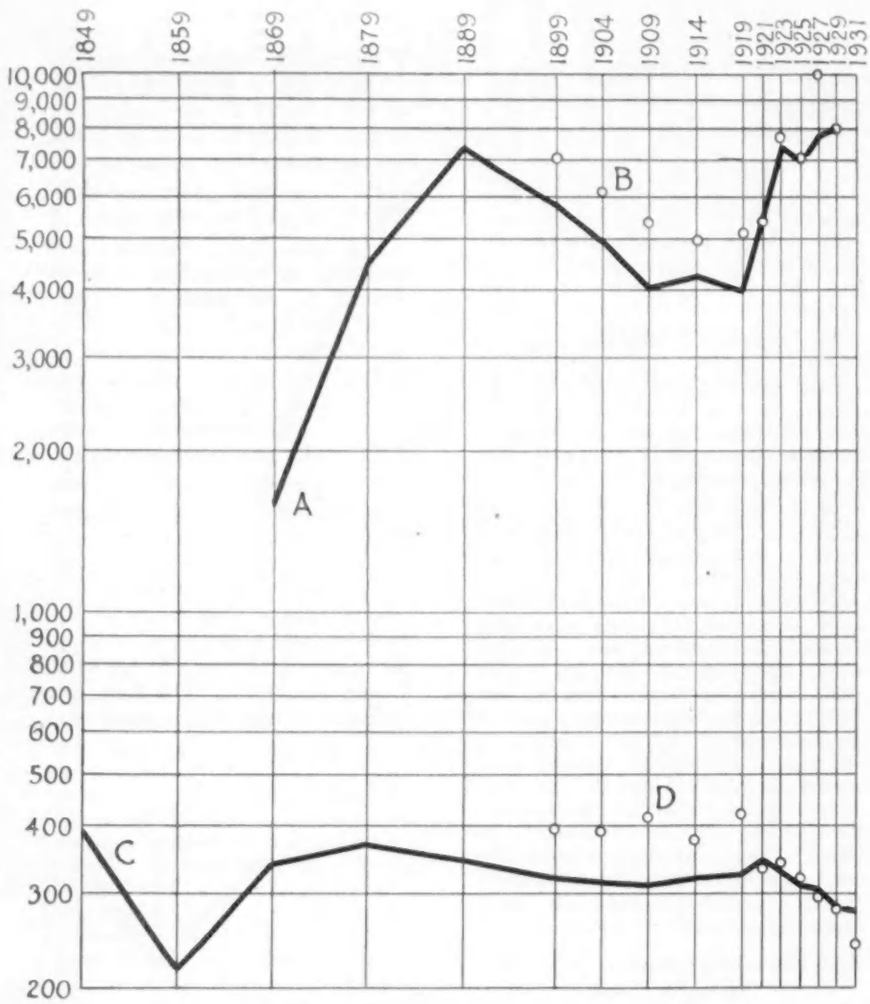


Chart 36—The Course of Real Wages Relative to Horse Power per Physical Unit of Value Added by Manufacture (A & B) and Relative to Physical Unit of Value Added per Wage Earner (C & D)

TABLE FOR CHART 36

Year	Real Wages: Computed From Wholesale Price Index—1926=100—See Chart 19	Real Wages: Computed From Cost of Living Index—1926=100—See Chart 18	(Value Added ÷ Wholesale Price Index) ÷ (Wage Earners) = Physical Units Value Added per Wage Earner Relatives—See Chart 31	(Horsepower per Wage Earner) ÷ (Physical Units Value Added per Wage Earner) Physical Units = (Dollars Value Added) ÷ (Wholesale Price Index) Relatives—See Chart 33	Real Wages Computed From Wholesale Prices, Curve A: (Real Wage) ÷ (Values in Column 4)	Real Wages Computed From Cost of Living, Points B: Relatives	Real Wages Computed From W.P.I.—Curve C: (Real Wage) ÷ (Values in Column 3)	Real Wages Computed From C. of L.—Points D: Relatives
1849	32.0	...	....	....	....	....	397	...
1859	36.7	...	....	....	....	....	219	...
1869	24.9	...	7,265	1,573	1,583	....	343	...
1879	45.7	...	12,260	1,018	4,490	....	373	...
1889	60.1	...	17,250	810	7,420	....	348	...
1899	63.1	77.5	19,630	1,095	5,769	7,080	321	395
1904	62.1	77.4	19,630	1,257	4,940	6,160	316	394
1909	59.4	79.7	19,100	1,480	4,010	5,380	311	417
1914	67.1	77.8	20,700	1,563	4,290	4,980	324	376
1919	65.0	83.9	19,880	1,639	3,965	5,120	327	422
1921	93.8	90.3	27,000	1,677	5,595	5,390	348	335
1923	96.6	99.6	29,250	1,288	7,500	7,740	330	341
1925	95.8	98.9	30,850	1,382	6,935	7,160	311	321
1926	100.0	100.0	....	....	....	....	...	...
1927	105.7	102.2	34,600	1,343	7,870	10,070	306	296
1929	106.3	105.2	37,400	1,303	8,160	8,080	284	282
1931	117.8	101.7	41,900	....	....	....	281	243

is one of how many hours per week and weeks per year he may choose to work at prevailing rates of wage. In times of depression the question resolves itself into one of how many hours per week or weeks per year he may find opportunity to work at prevailing rates of wage.

Customary hours of work and rates of wage vary widely among industries. Even within industries they vary widely with geographic location and also with the passage of time.

We have already considered the advance of average annual money wages and of relative real wages with the progress of mechanization in the manufacturing industries. It remains to consider the factor of annual wages; hours actually worked and hourly rates of wage. In order to arrive at general effects it is necessary to arrive at an average which will take into account all manufacturing industries, all geographical sections and all discontinuity of employment. Such an average may be developed by relating average annual wages actually paid per wage earner for all manufacturing industries to index numbers of wages per hour reduced to corresponding values in cents per hour and deriving the corresponding average hours per week.

Chart 40 has been constructed on this basis. In compiling the table from which this chart is plotted the annual index numbers for rates per hour are first reduced to averages centered on the censal years, using nine-year averages where census data are available at ten-year intervals, five-year averages where census data are available at five-year intervals and three-year averages where census data are available at two-year intervals. Actual rates in cents per hour are then related to corresponding index numbers of hourly rates in the period for which both are available and a series of average rates in cents per hour set up for the whole period.

From these data it is possible to compute the average hours per year necessary to accumulate the indicated annual earnings at the respective hourly rates. It is much more usual, however, to think of hours per week than of hours per year. For convenience of comparison with usual data, therefore, it has been assumed that 50 weeks per year is normal full employment, allowing for unavoidable absence, and the computation reduced to the equivalent number of hours per week necessary to accumulate the indicated annual wage. This assumption does not exclude the effect of discontinuity of employment, as in seasonal industries, since the results represent the average hours per week that would have been uniformly worked throughout the 50 weeks to accumulate the annual total, had employment been continuous throughout the year.

Abnormal deviations from indicated trend seem definitely related to known

TABLE FOR CHART 37

Year	Value of Products, Millions of Dollars	Value Added by Manufacture, Millions of Dollars	Wages, Millions of Dollars	Dollars of Wages per Dollar Value of Product	Dollars of Wages per Dollar of Value Added
1849	1,019	464	237	.2325	.5110
1859	1,886	854	379	.2010	.4440
1869	3,386	1,395	620	.1832	.4444
1879	5,370	1,973	948	.1766	.4805
1889	9,372	4,210	1,891	.2020	.4492
1899	11,407	4,831	2,008	.1755	.4146
1904	14,794	6,294	2,610	.1765	.4150
1909	20,672	8,529	3,427	.1657	.4020
1914	23,988	9,710	4,068	.1695	.4190
1919	62,042	24,809	10,462	.1687	.4216
1921	43,653	18,332	8,202	.1880	.4480
1923	60,556	25,850	11,009	.1819	.4260
1925	62,714	26,778	10,730	.1712	.4008
1927	62,718	27,585	10,849	.1731	.3935
1929	70,420	31,900	11,684	.1661	.3663
1931	41,333	19,913	7,226	.1748	.3630

Source—Bureau of the Census, see Statistical Abstract, 1932, p. 730.

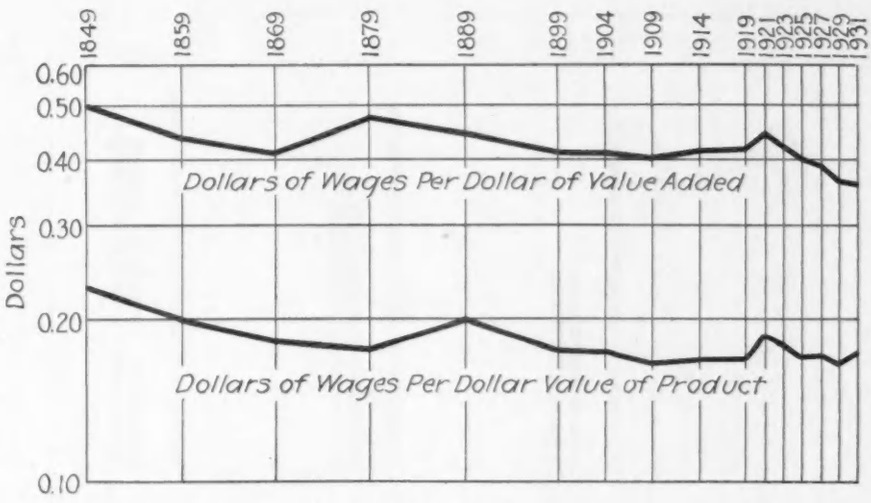


Chart 37—Dollars of Wages per Dollar of Value Added and Per Dollar Value of Product

events. The low point at 1869 would seem related to the disruptions following the Civil War. Money value of wage payments must have been materially affected by currency difficulties of that period. The low point at 1879 would probably reflect part-time employment during the depression of the 1870's. The high point at 1919 reflects prevalence of overtime work and the low at 1921 part-time work as does also the low point of 1931.

The trend of average hours actually worked has a surprisingly uniform downward course from a point near 60 hr. per week in 1849 to a point near 45 hr. per week in 1929. It has now flattened out to a nearly horizontal direction.

No stronger evidence could be presented to refute the advocates of dras-

TABLE FOR CHART 38

Year	Millions of Dollars: Value Added by Manufacture	Millions of Dollars: Wages	Wages as Percentage of Value Added	Millions of Dollars: Salaries	Millions of Dollars: Wages Plus Salaries	Salaries as a Percentage of Value Added by Manufacture
1849	464	237	51.0	....	....	...
1859	854	379	44.3	....	....	...
1869	1,395	620	44.4	....	....	...
1879	1,973	948	48.1	....	....	...
1889	4,210	1,891	45.0	....	....	...
1899	4,831	2,008	41.5	381	2,389	49.5
1904	6,294	2,610	41.5	574	3,184	50.6
1909	8,529	3,427	40.2	939	4,366	51.2
1914	9,710	4,068	41.9	1,274	5,342	55.0
1919	24,809	10,462	42.2	2,881	13,343	53.8
1921	18,332	8,202	44.7	2,563	10,765	58.8
1923	25,850	11,009	42.6	2,806	13,815	53.4
1925	26,778	10,730	40.1	2,922	13,652	51.0
1927	27,585	10,849	39.4	3,230	14,079	51.0
1929	31,900	11,684	36.6	3,595	15,279	47.8
1931	19,913	7,226	36.3	....	....	...

Source—Bureau of the Census, see Statistical Abstract, 1932, p. 730.

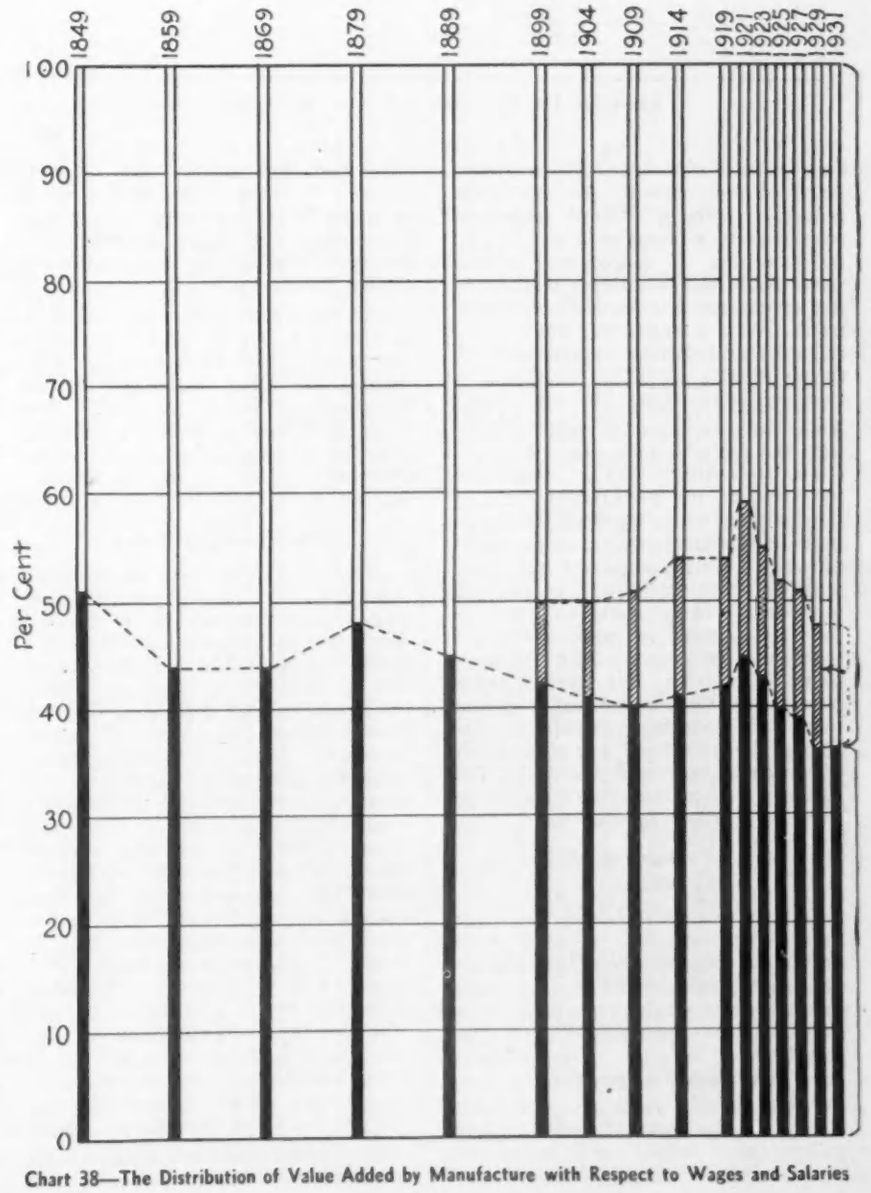


Chart 38—The Distribution of Value Added by Manufacture with Respect to Wages and Salaries

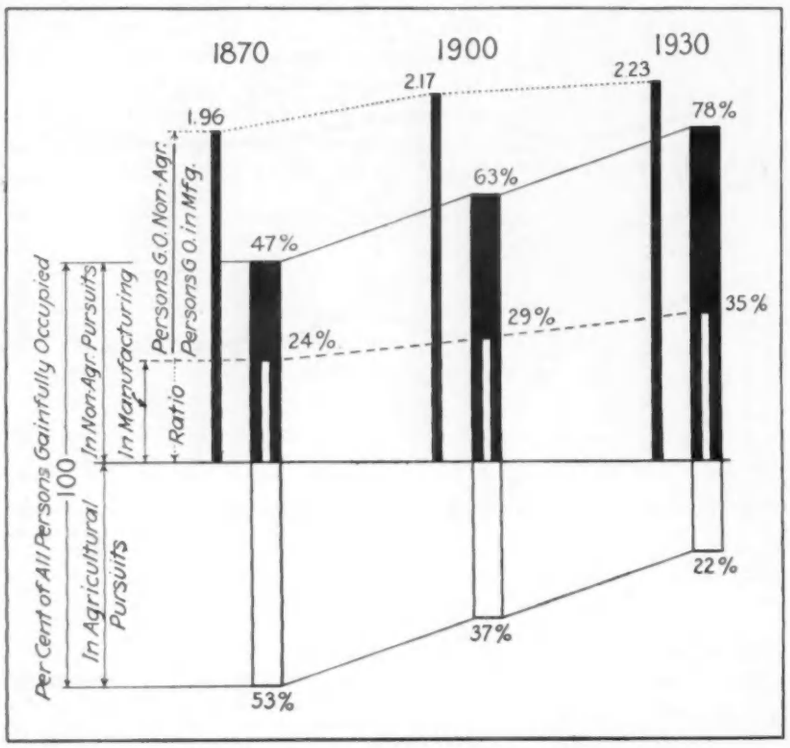


Chart 39—The Expanding Market for Manufactured Goods

TABLE FOR CHART 39

Year	Percentages of All Persons Gainfully Occupied: In Agricultural Pursuits	In Non Agricultural Pursuits	In Manufacturing	Persons Engaged in Non-Agricultural Pursuits to Persons Engaged in Manufacturing: Ratio
1870	53	47	24	1.96
1900	37	63	29	2.17
1930	22	78	35	2.23

tic reduction of hours in the nominal standard work week. An arbitrary reduction from a present indicated normal average week of about 45 hr. by one-third to a proposed 30-hr. week would not contribute to the relief of current widespread unemployment. Such a reduction would contribute only a further maladjustment to our already disrupted equilibrium.

The answer simply is that the American workman is not content with the fruits of part-time effort. If denied opportunity for full-time employment at his accustomed occupation he will seek to augment his earnings by part-time occupation in other pursuits. Such auxiliary pursuits, whether employment or independent occupation, being marginal in nature, serve only to depress employment and earnings in other occupations. Thus an iron molder who paints his own house or lays his neighbor's concrete sidewalk supplements the part-time earnings from his accustomed employment by depressing the market for other wage earners in other occupations.

Collateral Evidence on Hours and Rates

Data on wages and hours of labor in specific industries selected more or less at random from the Bureau of Labor Statistics Bulletin No. 499 cannot present such continuous series as would lend themselves to the construction of charts. The original data give weekly wages for the earlier and hourly rates for the later years. In the cases of puddlers and rollers the wages are estimated equivalents of tonnage rates. Despite probable inaccuracies of conversion, the data presented will serve to corroborate the trend of average wage rates and hours of labor and also to illustrate the wide diversity among industries.

The eight-hour day with Saturday half-holiday, that is, the 44-hr. week, was pretty well established in this country for many industries by the Government's war-time policy. The 12-hr. shift and seven-day week with a 24-hr. overlap on alternate weeks were still common in the steel industry not more than 10 years ago.

The Condition Today

The current status of the relations among money wages, relative real wages, wage rates and hours of labor can be very closely approximated from data appearing on page 16 of the January, 1933, issue of "Trend of Employment," published by the United States Department of Labor. Under the head of "Average hours worked per week per employee and average hourly earnings in 15 industrial groups, December, 1932, and January, 1933," we find that average hours per week actually worked by those who retained their jobs (not nominal standard work week) in the manufacturing groups were 37.5 in January, 1933, with average hourly earnings of 42.7 cents. To reduce these figures to a basis comparable with the figures of Chart 40 we may here also assume a normal of 50 weeks worked per year and arrive at an average value of approximately $16 per week and $800 annual wages.

The latest cost of living index available is 75.45 for December, 1932. If this cost of living were to remain constant through 1933 and average annual wages were to continue throughout the year at the January rate the resultant relative real wage would be 82.3 on the base 1926 = 100.

This is almost exactly equivalent to the status of 1919 (83.9 on base 1926 = 100) when wage rates averaged 48.1c. per hour, hours 48.1 per week and annual wages $1,163 per year. Comparing 1929 with January, 1933, we find average hourly wage rates reduced from 58.9c. to 42.7c. per hour (27.5 per cent) and average hours actually worked reduced from 44.6 to 37.5 (15.9 per cent) per week, resulting in a reduction of earnings of 39.10 per cent. In dollar figures the corresponding reduction of average annual earnings would be from $1,323 to $800, or 39.5 per cent. Recent figures compiled by the National Industrial Conference Board, Inc., taking into account both reduction in wage rates and hours worked indicate a reduction of 41 per cent in earnings, which is in almost exact agreement. Figures apply to those who remain at work, not to the wage-earner group as a whole.

A Possible Corrective

If markets were available to absorb the increased output and average hours per week could be increased from 37.5 to 44 (17.4 per cent) then average rates of wage could be reduced from 42.7 to 36.4c. per hour (15 per cent) without reduction of annual earnings. The reduced wage rate should be reflected in lower unit costs, lower prices and consequent lower cost of living or higher real wage. The resultant larger buying power should in turn absorb larger quantities of goods and thus effect the employment of larger numbers of wage earners.

These are average figures and are not applicable as flat percentages to all wage rates or all hours of labor.

For illustration, and going outside the manufacturing field, we quote a news dispatch from Chicago dated March 13, 1933:

"Unions in the building construction field in Chicago and contractors agreed to extend the present wage scale agreement which expired Sat-

urday until May 31, 1933, pending developments in economic conditions. All the unions except the structural iron workers agreed to the extension. This group is seeking a rate of $1.70 an hour as compared with the present scale of $1.35.

"Contractors have been seeking a reduction in wage scales to an average of $1 an hour, which would mean an average reduction of 35c. an hour from the present rates."

It is not easy to see how the average wage or salary earner in any other industry could afford to rent an apartment erected by craftsmen enjoying such relatively high wage rates.

The Significance of Secular Trends

The study of secular trends has been chiefly directed toward their elimination in connection with near term forecasting. The building and equipment of manufacturing establishments, however, involve the investment of considerable amounts of capital over relatively long periods of time. They come also largely to control the destinies of the populations that grow up around them. Such enterprises must, therefore, be planned and operated with regard to underlying long-time trends as well as with regard to short-time variations. The study of secular trends thus becomes a purpose as well as a means.

It becomes of vital importance to explore the long-time trend of developments in industry when current disturbances become so violent as to obscure the perspective of their most probable social and economic consequences.

Social and Economic Consequences

We find in the present examination of the long-time trend of mechanization in the manufacturing industries many collateral consequences penetrating deeply into the entire social and economic fabric of the whole people as well as into the industries themselves.

Of first importance is the general well-being of the people as a whole. In this question is involved the consideration of the opportunities for gaining a livelihood and whether on the whole that livelihood is expanding in the richness of human satisfactions beyond the barest necessities of keeping alive.

We find, on taking a broad view of the entire population with respect to its growth, its changing composition

(*Continued on Advertising Page* 10)

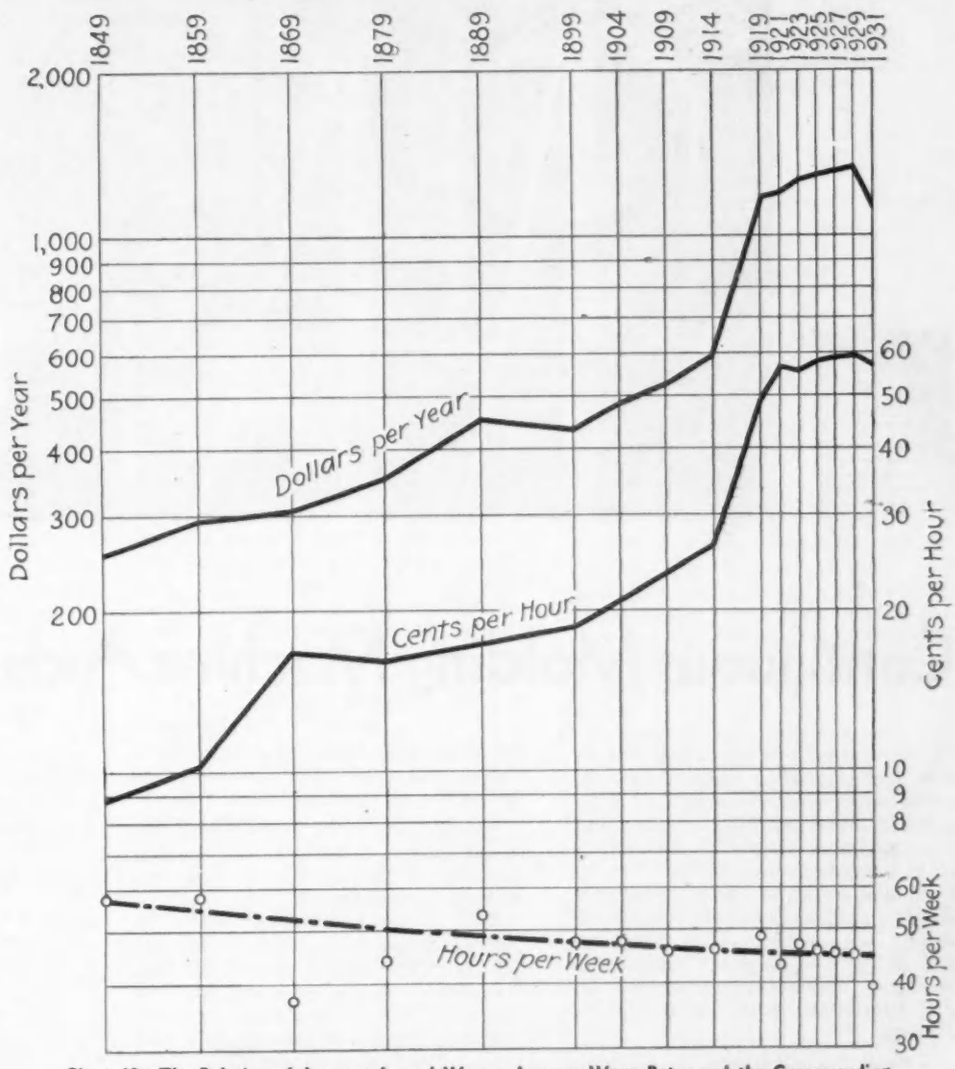


Chart 40—The Relation of Average Annual Wages, Average Wage Rates and the Corresponding Trend of Hours Worked per Week (Not standard work week)

TABLE FOR CHART 40

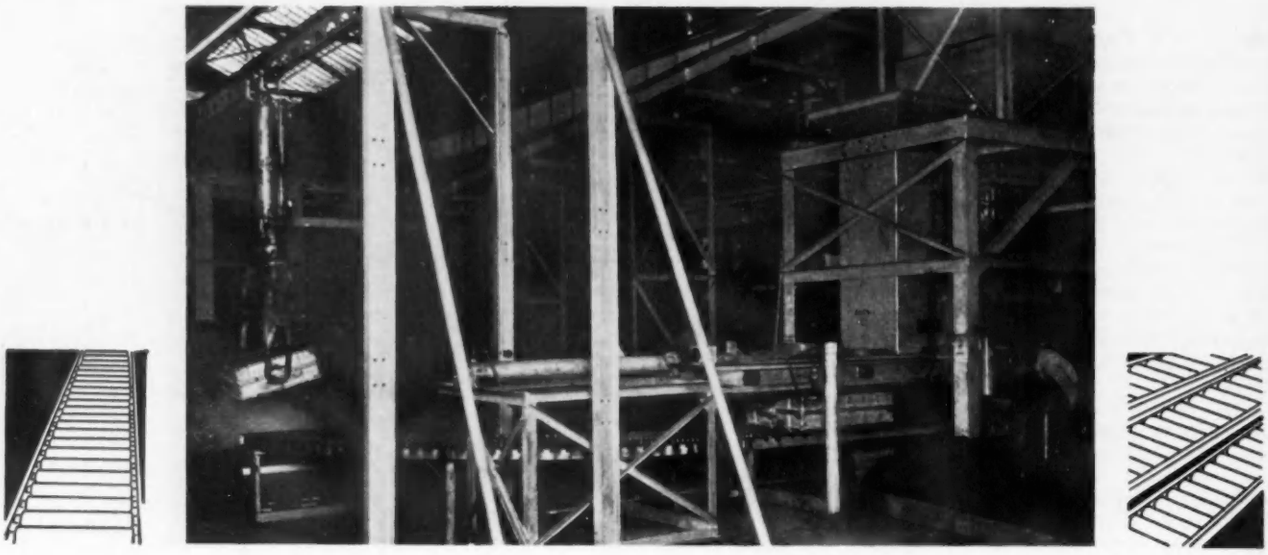
Year	Average Wages in Dollars per Year	Wages per Hour—Index Numbers—1913=100—Original Yearly Figures	Wages per Hour—Index Numbers—1913=100—Original Yearly Figures Reduced to Moving Averages Centered on Census Year (9 yr. mov.→5 yr. mov.→3 yr. mov.→Int. av.→3 yr. mov.→5 yr. mov.→9 yr. mov.→Int. av.→)	Wages per Hour—Money Values Computed From Index Number	Average Hours Actually Worked per Week Computed From Wages per Year and Wages per Hour on the Basis of 50 Weeks per Year
1849	248	36.0	34.6	$0.086	57.2
1859	289	39.0	39.9	.100	57.8
1869	300	66.0	65.2	.163	36.7
1879	347	59.0	62.2	.155	44.6
1889	445	68.0	67.3	.168	52.8
1899	425	70.0	72.1	.180	47.0
1904	478	80.0	80.8	.201	47.3
1909	518	90.0	91.2	.227	45.3
1914	590	102.0	102.6	.256	45.8
1919	1,163	184.0	192.7	.481	48.1
1921	1,180	218.0	220.0	.549	42.8
1923	1,255	217.0	216.0	.538	46.3
1925	1,280	226.0	226.0	.564	45.2
1927	1,300	231.0	230.6	.574	45.0
1929	1,323	233.0	....	.589	44.6
1931	1,110	....	....	.564	39.1

Supplementary Table Showing Derivation of Money Value of Wages per Hour From Index Numbers

Relation of Money Values of Wages per Hour to Index Numbers

Year	Index Numbers—1913=100	Index Numbers—"S. A.," p. 311, Revised to 1923=100	Index Numbers—"S. A.," p. 324	Hourly Earnings—"S. A.," p. 324
1921	218	100.5	97.0	$0.525
1922	208	95.8	91.5	.495
1923	217	100.0	100.0	.541
1924	223	102.7	104.0	.562
1925	226	104.1	103.7	.561
1926	229	105.5	105.0	.568
1927	231	106.5	106.5	.576
1928	232	107.0	107.0	.579
1929	233	107.4	108.9	.589
1930	...	....	108.9	.589
1931	...	....	104.3	.564

Sources—Wages, Bureau of the Census, see Statistical Abstract, 1932, p. 730; Wages per Hour, Bureau of Labor Statistics, see Statistical Abstract, 1932, p. 311; Wages per Hour, National Industrial Conference Board, Inc., see Statistical Abstract, 1932, p. 324.



Continuous Molding Machine Aids Production

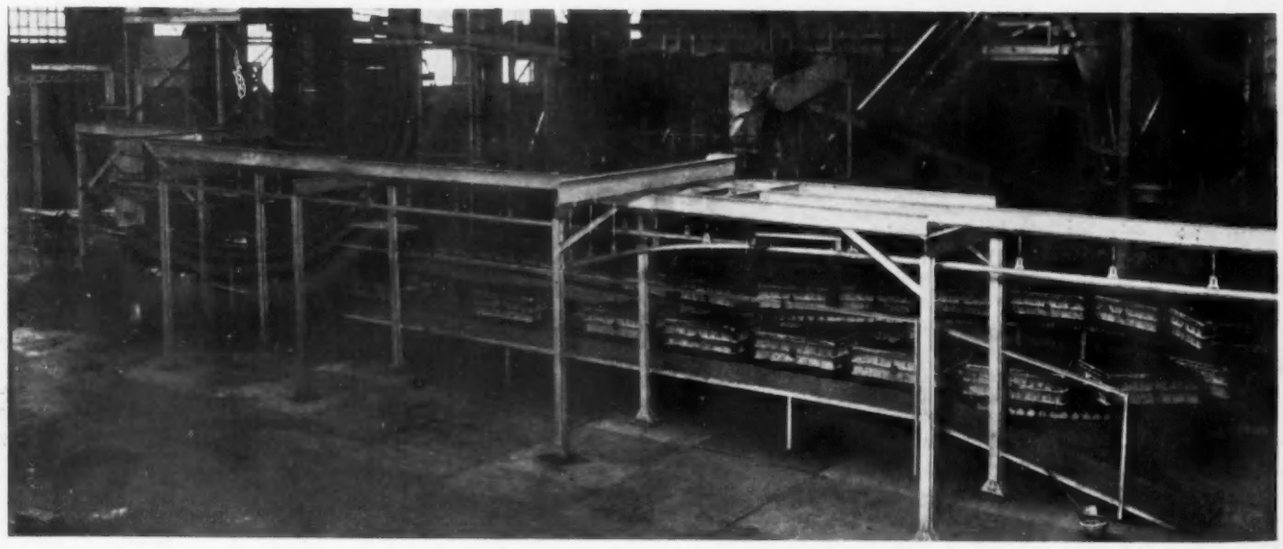
A FOUNDRY set-up consisting essentially of a continuous conveyor in the form of an oval, an automatic molding machine, a pneumatic vibrator, and conveyors and equipment for conditioning the sand at the Cleveland works of the Westinghouse Electric & Mfg. Co. is capable of producing 120 finished castings in 8 hr., and has proved its worth many times on large, special orders where time and production schedules were vital factors.

Twenty-five aluminum flasks travel through the molding and casting cycles on a continuous conveyor. The flasks are 28 in. wide, 43 in. long with a 6-in. cope and 6-in. drag. They are used on aluminum castings for street-light units, cast iron range frames and doors, and cast iron bases for floor model ironers.

The molding cycle begins when an empty flask is brought to the molding machine on the conveyor. The machine separates the cope and drag and inserts a match plate pattern. The flask is closed, turned over, filled and jolted. The bottom board is then clamped in place and the flask is again rolled over for filling and tamping the cope. The match plate pattern is then removed, the flask closed and the mold continues along the conveyor. All these operations are performed by the molding machine, their sequence only being directed by the operator.

Two men pour the molds as they progress along their route. Having cooled sufficiently before arriving at the shakeout platform, a pneumatic vibrator shakes out the casting and removes the molding sand from the flask. The sand falls through a grate upon a belt conveyor and travels back to the conditioner for use again.

Gifford-Wood Co., Hudson, N. Y., has been awarded contract for coal and ash handling equipment for heating plant at Great Meadow Prison, Comstock, N. Y.; also contract for lime conveyor for new plant of Procter & Gamble Mfg. Co. at Staten Island, N. Y.



Automatic molding machine and layout at the Cleveland Westinghouse foundry. Above—Automatic molding machine, showing the molder in operation at the right and the vibrator shakeout for removing the castings at the left.

Job Order and Mass Production Meeting Held at Cleveland

Machine Set-Up Time, Product Design, Styling and Inventory Turnover Discussed at Management Association Conferences

PLANT economies that may be effected by the reduction of set-up time in the machine shop, problems that result from manufacturing products in smaller quantities than a few years ago, redesigning of products to increase manufacturing efficiency, restyling to increase sales, and the present-day policy of carrying very low inventories were subjects that were given earnest consideration in papers and discussions at job order and mass production conferences held by the American Management Association at the Hotel Statler, Cleveland, April 13 and 14. Two speakers emphasized the necessity of close cooperation between buyers and sellers as a means of avoiding shortage of raw materials that might result from carrying very low inventories.

Product design and its influence on set-up time was discussed by Tell Berna, general sales manager, National Acme Co., Cleveland, and Walter D. Teague, New York, industrial designer. Mr. Berna's paper is published in full in this issue of THE IRON AGE.

Price Not Controlling Sales Factor

Importance of design as a factor in increasing sales appeal was stressed by Mr. Teague, who declared that economical production depends largely on the designer's efforts. The designer can supply help in designing a product that will assist in reducing the production cost. However, the speaker declared, "Economy is seldom the controlling factor in design. The success of a product does not depend primarily on the ease of manufacture but on sales.

"Quality, appearance and price," he continued, "are the three important factors in producing and marketing a product. A balance must be maintained between these factors. About every product falls under a certain price range. The problem of the manufacturer is to obtain the best possible results in producing a product and not necessarily to produce a cheaper product."

The automotive industry was used by the speaker as an illustration that price is not necessarily the controlling factor in successfully marketing a product. Some models of automobiles have not sold readily because they have not appealed to the customer's taste and manufacturers have cut prices in their attempts to sell these cars but price reductions have not proved successful.

New materials and processes have been introduced, the speaker pointed out, the use of which permits the manufacturer to improve the quality of his product. Among these, he mentioned alloys, molding compounds, metal finishes and plating processes.

Trend Toward Simplicity of Style

There is another important factor today, he said, and that is style. We are now emerging into a new era, an era of style, and he stated that similar products now have a similarity in appearance even though made in different parts of the world. Style has its origin in the materials available and the psychological attitude of the people. Preferences today, he said, are for simplicity in product and the elimination of useless gadgets. The avoidance of non-essentials in making products aids in economy in production.

The speaker used a number of lantern slides to show changes toward simplicity in style. These included kodaks, thermometers, boiler control equipment and other products the restyling of which had caused an increase in sales. Other views illustrating the tendency toward simplicity in style showed office buildings, residences and automobiles.

Set-Up Time Only One Factor in Tool Selection

The effect of proper selection of machines and equipment in a job order plant was discussed by A. J. Brandt, A. J. Brandt, Inc., Detroit. The author made three classifications of job order shops—small machine shops catering to a miscellaneous and general machine shop business, contract shops that might be regarded as mass production shops, and shops making products that require a certain amount of engineering for each job. In the first classification he included general machine shops and small foundries and stamping plants. The mass production shops are usually the outgrowth of shops of the first class. These shops engage in intensive production and include those that cater to the automotive industry, vitreous enameling plants making refrigerator parts and die casting shops. In the third classification are plants that make such equipment as rolling mill and conveying equipment, but do not lose the characteristics of job order shops.

There are so many factors in the selection of equipment which vary with conditions, the speaker said, that it is almost imperative that each problem be considered on its own merits. There is only one factor which is common in the selection of equipment which should be the determining factor, both for the job order shop and mass production plants. "The basis of this determining factor," he said, "is that no expenditure is warranted unless a better return on investment is shown by it over a given period of time than by any other expenditure considered for the same purpose."

Set-up time, according to the speaker, was but one of the many factors and the importance of its consideration varies with specific problems. The selection of a piece of equipment depends to a large extent upon its adaptability, flexibility, maintenance and operating costs, durability and original installed cost. The flexibility of the machine, he said, depends upon its ability to provide a wide range for varied sizes of work, a wide range of feeds and speeds and a design that will permit the use of a wide variety of tools and fixtures. However, the desire for flexibility may cause an unwise choice, as a premium may be paid for extreme flexibility which may not be warranted. Within economic ranges maximum flexibility is desirable and the lack of flexibility often causes high obsolescence charges.

If a choice is required between high maintenance cost and low set-up cost, the preference should be given to low maintenance cost. While the cost of equipment is often the deciding factor in its selection, failure to examine the cost in relation to the other features may result in an unwise investment.

Machines were classified by Mr. Brandt as single-purpose, special-purpose and general-purpose equipment and he said that each type may find its proper place in the job order shop. The single-purpose machine has had its place in mass production shops, but is usually ruled out because of lack of flexibility in shops coming under the other two classifications. The special-purpose machine for a specific variety of work in the range of sizes has a very definite place in the job order shop. General-purpose machines used for a wide variety and range of work are naturally the backbone of equipment of the majority of job order shops.

Trend Away from Single-Purpose Machines

With a given machine, set-up time is dependent on tools, gages and fixtures, the speaker pointed out. Good tooling design is the result of combination of experience and ingenuity. Shops often may find it reduces tool cost by having tools designed by an outside organization that specializes on this work. It is also often desirable to have tools and fixtures built in another shop. However, it is preferable for a company to make its own tools where quantities warrant. Use of welding equipment is almost essential for quick and cheap production of tools.

Were equipment selected from the standard of set-up time alone, single-purpose machines would be chosen,

said the speaker, but other factors usually are of more importance than the set-up time. Turret lathes should be provided when there is a reasonable amount of repetitive work. The problem of set-up of screw machines and automatics, as well as multiple-head boring mills, is seldom the major problem. Set-up for secondary operations may be reduced or eliminated if special equipment is applied to standard machines. In drilling equipment, the radial drill equipped with quick-change drill sockets probably is the most flexible and set-up time can be reduced by proper jig design. The multiple gang drill is ideal for small castings if the quantities warrant the construction of several jigs. Multiple-spindle drill heads conserve set-up time but can only be used to advantage when large runs justify their purchase. The study of vertical milling equipment well equipped with cutter heads opens possibilities that are not generally appreciated. The adaptation of milling heads to planer cross-rails permits the conversion of planers to milling equipment with low set-up cost for gang milling.

"The trend of thought today in mass production plants," said Mr. Brandt in conclusion, "is toward flexibility of equipment in order to avoid the great expense of obsolescence of single-purpose machines. The lessons learned from the quick set-up features of single-purpose machines are being applied to adaptations of standard machines. By proper study or by securing assistance from outside sources the job order shop can select the proper machines and their auxiliaries in such a manner as to approach the low set-up time ideal of the mass production plant."

In the discussion R. S. Perry, Ingersoll Milling Machine Co., told of a plan adopted by the Hudson Motor Car Co. for handling its machinery repairs. A machinery repair man was placed in his department and his pay was based not on the time he spent in doing repair work but on the time of operation of the machinery in the department. The plan worked very successfully, he said.

Buyer-Seller Cooperation Promotes Inventory Turnover

Analyzing purchasing policies in speeding up inventory turnover was discussed by R. M. Bowman, purchasing department, Republic Steel Corpn., and H. H. Krause, purchasing agent, National Screw & Mfg. Co., Cleveland. Mr. Bowman spoke of the growing tendency of consumers to reduce inventories to the lowest possible level, in cases almost to their entire elimination, and of the advantages of having funds liquid that might be used for other purposes. While this is a sound policy, he said, it is limited because somewhere between the restricted raw material and the semi-finished or finished article someone must maintain a stock to provide for the fluctuating demands of the consumer. Slowly moving inventories of such material as iron ore and fire clay for brick may be unavoidable. However, in the case of many kinds of raw material the seller is usually willing to cooperate with the buyer so that the latter can maintain inventories at low levels. Should a change in practice make the material unmarketable the buyer should relieve the seller of such stocks. Also the buyer should have two or more sources of supply to avoid delay in deliveries.

The ability to make prompt deliveries demanded doubtless has been brought about, he said, by the closer cooperation between buyer and seller, as well as by the introduction of more efficient manufacturing methods. Many manufacturers who are able to make prompt deliveries and still carry no inventory have passed this burden back to someone else. While much has been done along these lines, the sooner producers and consumers acquaint each other with their respective problems and requirements the sooner will much of our economic waste be stopped.

Standardization, the speaker held, is a subject worthy of much careful study by both producer and consumer. This would eliminate special materials or specifications. Referring to a specific case, he said that brick makers are now cooperating with consumers for the purpose of developing a series of standard brick shapes. At present there are so many shapes that the steel companies have been carrying excessively large stocks.

Everybody is becoming inventory-minded to a greater or less extent, declared Mr. Bowman, who referred to losses caused by write-downs in prices in a declining market. The proper amount of inventory, he said, depends on several factors. Many kinds of material are carried as stock items and these should be turned over at least 12 times per year.

During adverse business conditions new companies have come into existence and old ones have taken on new lines, but in the speaker's opinion these newcomers usually prove undependable sources of supply. The new producer after a short time often discontinues his new activities. In the speaker's opinion, the buyer should give his full support to the old well established firm.

Advantage of Cooperating with Other Departments

Mr. Bowman emphasized that the purchasing department can render valuable service to the operating departments by being on the alert for new materials, tools and equipment that will effect economies. He also recommended a salvage and reclamation division as an integral part of an efficient purchasing department. Requisitions by companies having several plants should pass through this department to determine whether the material or substitutes are available at any of its plants.

The importance of inventory control, the speaker said, is perhaps best illustrated by reference to recent annual reports of large companies showing the reductions of inventory expenditures. Cooperation between purchasing, executive and operating departments, he declared, has made it possible to properly control inventories and to conserve cash. Much purchasing formerly was done on the basis of personal opinion, resulting in stocks of obsolete material. But due to the closer cooperation of all departments, buying is now being done on a strictly scientific basis.

"Price Buying" Purchasing Agent Passing Out

Mr. Krause emphasized the importance of a purchasing agent as a factor in management. Taking up the price situation, he believed that there will be no price advance in some commodities for a long time and consequently the placing of long-term contracts at first indication of an advance should be carefully considered. Before there can be real price advances, purchasing power, he said, must be increased by getting men back to work. Therefore he believed that the employment index should be carefully watched. When this begins a steady rise, look for a rise in commodity prices, he said.

A factor that in the speaker's opinion has a marked effect on raw material inventory is the speeding up of transportation facilities. He believed that plants in the future will operate on much smaller inventories than in the past. The purely "price buying" purchasing agent is slowly being weeded out, in the speaker's opinion. He believed in establishing several good sources of supply and sticking to them, provided prices, service and quality are right.

To operate efficiently on small material inventory the purchasing agent must know how long it takes the vendor to produce the material. Close cooperation between the purchasing agent and the supplier frequently benefits both parties. When the policy of purchasing from a limited number of vendors is followed a feeling of mutual confidence is built up. When deliveries become extended the purchasing agent who is not an inveterate shopper will get the advantage. He will also be given an opportunity to cover at old prices in case of a price advance. Smaller inventories than were considered sound ten years ago will reduce operating expenses, he said, and enable plants to turn their inventory over two to four times per year oftener than they have been doing.

The reorganization of factories to handle business at today's volume if they are to be run at a profit was declared necessary by G. E. Bechtel, Trundle Engineering Co., Cleveland, discussing production methods to speed up turnover. He also urged manufacturers to buy new equipment now to improve their manufacturing processes and reduce costs.

Centralized Control is Aim of British Steel Reorganization Plan

WASHINGTON, April 18—With the declared purpose of raising the British iron and steel industry as a whole to a higher level of efficiency, a plan is now in the hands of the British Imports Duties Advisory Committee calling for a high degree of centralized control of the country's iron and steel plants, according to a report to the Commerce Department's Iron and Steel Division from Trade Commissioner James Somerville, London.

The plan provides for the formation of a corporation to be known as the "Iron and Steel Corporation of Great Britain" to embrace all the main divisions of the industry and to be given, if necessary, statutory powers. It was drawn up by a national committee within the industry and submitted to the British Import Duties Advisory Committee.

The objective of the plan, to increase the efficiency of the nation's iron and steel industry so that it will be better able to compete in the world market, is to be effected, from the administrative point of view, mainly through more unified and centralized control. From the viewpoint of production technique its aim will be achieved through the concentration of production in the more efficient plants and elimination of redundant and inefficient works.

The existing National Federation of Iron and Steel Manufacturers is to be absorbed by the new corporation, and the 50 or more existing sectional associations, whose activities have been mainly concerned with price maintenance, are to be combined into 11 associations, designed to be effective instruments for the control of production in the main branches of the industry.

Each of these associations is to have a constitution, which shall effectively provide, among other things, for "preventing wasteful competition among its members, while reasonably safeguarding the interests of the members of other associations in the corporation; for securing the progressive concentration of production in the more efficient plants; and for affording assistance where necessary to the export trade."

It is provided that all these associations so constituted and approved by the national corporation as having fulfilled the necessary membership conditions may be admitted into the "British Iron and Steel Export Association and Company." The corporation itself will perform, in general, the same functions for the export trade as do the different associations for production within their prospective industries.

The central organization is to derive its funds from an annual levy on each ton of pig iron and ingot steel, and by a levy on all members of the corporation not producing pig iron and ingot steel, not to exceed five shillings per £100 wages paid per annum, or by other approved methods.

Opinion as to the possibilities of such a plan being actually put into operation is said to be as yet undivided in British iron and steel circles, but it is pointed out that official Government opinion, as expressed in a recent official memorandum on the subject, has stressed the fact that the "interests of the industry itself can best be served if this matter of reorganization is taken in hand by the industry rather than by external authority."

Rail Output in 1932 Lowest Since 1866

Production of rails in the United States in 1932 amounted to only 402,566 gross tons, according to the statistical report of the American Iron and Steel Institute. This was the smallest annual output since 1866, the year in which the first steel rails were rolled in the United States. Only twice in 50 years, in 1884 and 1885, has the production of steel rails fallen below a million tons.

Last year's output consisted of 393,014 tons of open-hearth rails, 64 tons of Bessemer rails and 9488 tons of rerolled rails. The 1932 output was more than 65 per cent below the total of 1,157,751 tons in 1931.

Of the 1932 total, 128,522 tons were of 120 lb. and over, 215,091 tons were 100 lb. and over but less than 120 lb., 28,593 tons were 85 lb. and over but less than 100 lb., 13,705 tons were 50 lb. and over but less than 85 lb. and 16,655 tons were under 50 lb. The total production of alloy-treated steel rails in 1932 was 565 tons.

Bulk of Foreign Pig Iron Enters at Philadelphia

WASHINGTON, April 18.—Philadelphia is the leading port of entry for incoming shipments of foreign pig iron. In the first quarter of the current year, receipts at Philadelphia totaled 14,111 gross tons, of which 7829 tons came from British India; 5134 tons from the Netherlands and 1004 tons from Manchuria.

In noting the increase of Indian pig iron exports to the United States, Vice-consul F. Russell Engdahl, Calcutta, said that in the first two months of 1933 they amounted to 8219 tons, of which over 75 per cent was consigned to Philadelphia. Most of the Indian pig iron consigned to the Atlantic ports, he says, is being booked at $9.50 per ton, c.i.f., Philadelphia, or other Atlantic ports although some business, he adds, is being done at $9.90 and $10.50, c.i.f. Vice-consul Engdahl says that, at an average exchange rate of 387 rupees per $100, the domestic price of Indian iron is equal to between $16 and $17 a ton as against the export price of less than one-third that figure.

Millimeter Conversion Standard Approved

Approval of the inch-millimeter conversion ratio of 25.4 as an American standard has been announced by the American Standards Association. The standard includes conversion tables and recommendations for the rounding of converted values.

The standing committee appointed by the general conference of industry plans recommending publication by the A.S.A. of more extensive conversion tables based on the ratio of 25.4, and also application of the system of rounded numerical values included in the standard to industrial work in general. The committee includes C. V. Beal, Society of Automotive Engineers, chairman; L. F. Adams, General Electric Co.; H. W. Bearce, division of weights and measures, Bureau of Standards; F. O. Hoagland, Pratt & Whitney Co.; C. E. Johansson, Ford Motor Co.; C. B. LePage, American Society of Mechanical Engineers; and P. V. Miller, Taft-Peirce Co.

Production of Crankshafts in Permanent Molds

The automatic permanent-mold casting of gray iron crankshafts and valve stems has recently been put on a production basis in a machine which was designed and developed by A. W. Morris, consulting metallurgical engineer, Springfield, Mass. The machine is remote controlled and is completely automatic, including such items as the rate of melting, the setting of cores, and the initial heat treatment of the ejected castings. A description of the operation of the machine, together with an illustration, will appear in an early issue of THE IRON AGE.

R. F. C. Loan Granted for Portland Public Market

WASHINGTON, April 18.—About $360,000 will be spent for building materials in the construction of a new city market in Portland, Ore., by the Public Market Co., for which the Reconstruction Finance Corpn. has approved a loan of $724,625.

Arc Welders With Increased Capacity

NEW model arc welders with capacity ratings ranging from 5 kw. (125 amp. at 40 volts) to 24 kw. (600 amp. at 40 volts) have been announced by the Hobart Brothers Co., Troy, Ohio.

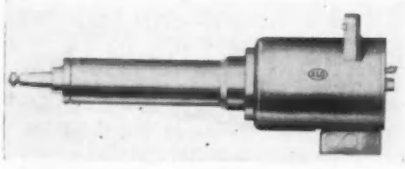
In addition to an increase of some 60 per cent in welding capacity as compared with previous Hobart welders, the new models feature new drip-proof housings with three-point louvre ventilation and unusually cool operation. Reverse polarity switch with double-scale meters, selective reactance and remote control are provided. High efficiency, high power factor, uniform welding current, arc tenacity and quick recovery, and freedom from sticking and splattering are claimed. The machines are built with electric motor or gasoline engine drive, as well as for pulley and coupling drive.

Increase in welding capacity is approximately 60 per cent The drive may be gasoline engine or electric motor.

Inbuilt Motor-Driven Surface-Grinder Spindle

IN the inbuilt balanced motor-driven grinding spindle designed by the Ex-Cell-O Aircraft & Tool Corpn., Detroit, for the No. 3 Abrasive surface grinder, the rotor of the electric driving motor is mounted directly on the spindle shaft, thereby eliminating couplings or similar methods of drive between motor and spindle. The motor field is mounted in the opposite end of the spindle from the grinding wheel, forming a compact and rigid unit. The electric motor, which is 1 hp., can be furnished for 220, 440 or 550 volt, three phase, 50 or 60 cycle operation.

The grinding spindle portion of this unit is of the same construction as other spindles built by the company, and Ex-Cell-O precision ball bearings are employed throughout except on the outer end of the motor, where oil-less bearing is used. The new spindle unit eliminates belts and pulleys for driving the grinding spindle.



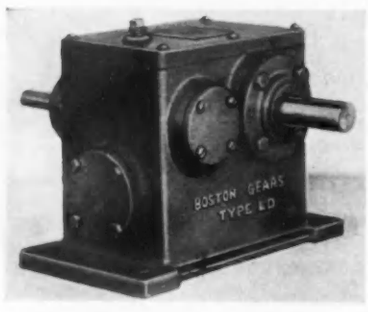
With the rotor of the driving motor mounted directly on the spindle shaft, the need of couplings or other driving means is eliminated.

Worm Gear and Helical Type Speed Reducers

STANDARDIZED speed reducers of compound worm gear type and of compound helical type have been added to the line of the Boston Gear Works, Inc., Quincy, Mass.

The worm gear reducer, designated as the LD, is especially adapted for slow-moving driven members, such as small stoker and conveyor drives. It is available in ratios from 37.5 to 1740 to 1. The gears are of cast bronze and the worms are of hardened steel with threads ground. Timken taper roller bearings are employed.

The compound helical type speed reducer, designated as the HK, is also assembled from standard parts. It can be furnished in ratios ranging from 9.79 to 84 to 1. It is equipped with Timken bearings and all moving parts are amply lubricated by means of the splash system.



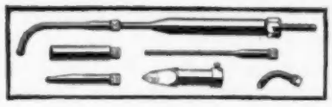
Worm gear speed reducer for small stoker, conveyor and similar drives.

Burnishing Barrels With Copper Lining

SUBSTANTIAL savings in both production and maintenance are claimed for a new self-locking copper lining for ball burnishing barrels (patent applied for), which is being marketed by the Abbott Ball Co., Hartford, Conn. The design of the lining is said to provide additional movement in the barrel, giving a quicker finish, and as the lining also acts as a burnishing medium, it brings a new effectiveness to the burnishing process.

Outfit for Soldering and Other Uses

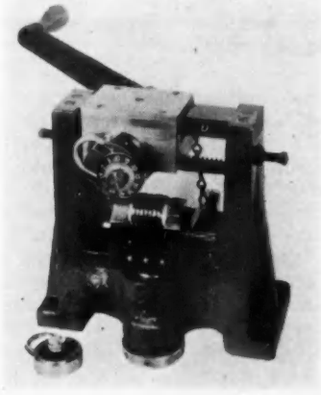
FOR soldering, tempering, light brazing, wire splicing and other applications requiring heat, the St. Paul Welding & Mfg. Co., St. Paul, Minn., is offering the new soldering outfit illustrated. This outfit, designated as the Torit No. 23, is not intended for welding. It consists of a small torch with four different types of tips, a soldering copper, rubber tubing and connection for the small Presto acetylene tank. Oxygen or compressed air are not required; the air necessary for combustion is syphoned through the tips.

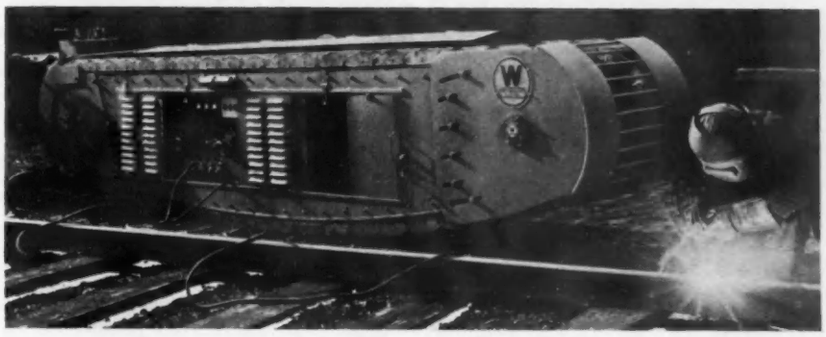


Bench Unit for Marking Locks and Other Articles

FOR marking serial numbers on locks and similar articles, the Noble & Westbrook Mfg. Co., East Hartford, Conn., has developed the bench model marking machine illustrated. In this unit, the device for holding the lock is connected directly with the handle of the machine. This not only operates the lock in a forward direction but holds it in the correct position. By turning the handle, the lock is carried over the numbering head (by means of a small rack and gear).

The automatic numbering head is placed below the article being marked, to enable the operator to keep a close check on the series of numbers being marked. After the numbers are rolled on the lock, and during the return stroke of the handle, the wheels in the numbering head are automatically advanced to the next highest number. Suitable adjustment is made for raising the numbering head to produce the desired depth of mark.





Welder for Railroad Track Maintenance

ONE of the six tractor welders recently purchased by the Lehigh Valley Railroad from the Westinghouse Electric & Mfg. Co., East Pittsburgh, for track maintenance work, is shown in the illustration. Developed to fill the need for a mobile power supply unit which does not require frequent transferring to and from the track for movement from one point to another, this welder eliminates use of long and expensive cable leads and does not interfere with traffic or signal operations. It is capable of operating along the shoulder of the track entirely clear of trains, can ascend slopes up to about 35 deg. and is stable in operation on side slopes of 45 deg. Designed particularly for reclaiming battered rail ends, crossovers, switches, frogs, repairing bridge structures and for other welding operations, it is also useful for auxiliary power for maintenance of way tools such as rail grinders, drills, slotters, etc.

The cables furnished provide for welding 12 joints between moves. While this necessitates frequent movement of the tractor, the moves are made quickly by one man and do not interfere with the right of way. The tractor operator when not moving the tractor is able to do all of the slotting and grinding operations of the newly welded joints. Pivot turns are possible on any kind of ground, but a platform is usually carried with the tractor for crossing tracks and for convenience in making pivot turns. Use of the platform protects the rails and also prevents the tractor from closing signal circuits.

Overall width of the tractor is 30 in., allowing the unit to travel along the shoulder or between the rails. Likewise the height is kept to a minimum to permit traffic clearance with the welder on the shoulder of the track. The height from the ground to the top of the upper tread is 36 in. All equipment is compactly assembled so as to reduce the overall length and thus maintain mobility.

The tractor structure consists of a supporting steel framework, the sides of which are inclosed with heavy steel plate having suitable openings for ready access to generator controls, gasoline engine, etc. A bulkhead is built into the rear of the frame on which the two propulsion motors are mounted. This bulkhead, motors, worm gearing and tread sprockets are removable as one unit, thus facilitating maintenance. The front is provided with enclosures and cross rods forming a guard against damage to engine radiator, treads and idling sprockets. Two driving sprockets, mechanically separate, are geared direct to the propulsion motors and located, one on each side, at rear of tractor.

A Westinghouse FlexArc welding generator provides welding current for one operator. It will handle both bare and coated electrodes. Built into the unit frame with the welding generator is an auxiliary generator, compound wound, for supplying direct current for tools and lights. This generator also furnishes excitation to the welding generator.

The gasoline power unit is a Buda six-cylinder, 65-hp. engine. Provision is made for cranking the engine through side of tractor. The two propulsion motors take power from the variable-voltage constant current welding generator. The speed is regulated by varying the field excitation of the welding generator by means of the rheostat on the welding control panel. Hand-operated drum switches, one for each motor, provide for forward and reverse movements as well as starting and stopping the tractor. The control arrangement permits welding and grinding to be carired on simultaneously.

New Air-Operated Automatic Spot Welder

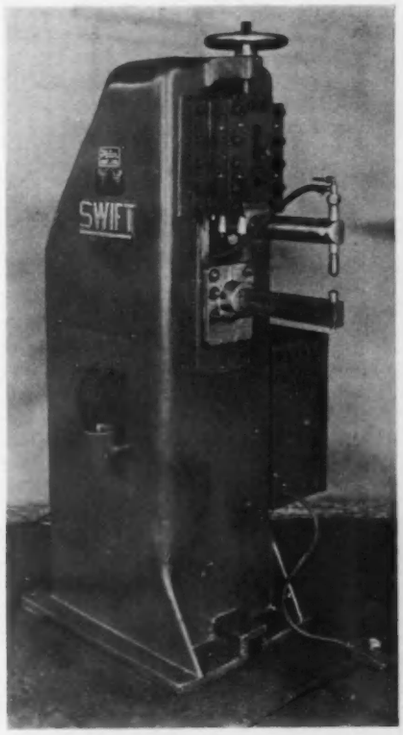
FOR production spot welding of steel, including stainless steel, aluminum, brass and copper, the Swift Electric Welder Co., Detroit, has developed a new type air-operated automatic spot welding machine.

Transformer capacities are 25 to 40 kva. Transformers have class B insulated Bakelite-treated primary windings wound to operate on 220, 440 or 550 volts alternating single-phase current. There are six points of heat regulation for welding a wide range of work up to a combined thickness of ¼ in. in steel.

A small main air cylinder operating through a straightening toggle delivers ample pressure to the work; unusual efficiency in air consumption is claimed. The upper head of the machine has graduated handwheel for vertical adjustment, permitting quick set-up of machine.

In the air control mechanism there is a shaft carrying adjustable cams for controlling the current and air valves; it is driven by a 1/6-hp. synchronous motor through reducer and change speed gears. The change gears provide wide speed variation, up to 180 reciprocations of the ram per minute. A multiple-tooth clutch electrically controlled by magnetic switch and operated by foot switch is mounted on the camshaft. An anti-repeat interlock switch prevents the machine repeating, even if the operator fails to take his foot from the pedal. It may be disconnected, however, for rapid repeat welding.

The split cam current control switch is made up of two cams having a series of drilled holes, the relationship of which may be changed to obtain 40 different values in the amount of current-on time for making a weld. These values are in units of complete cycles, and an adjustment is provided for cutting the current off at the zero point of the cycle to avoid arcing and burning off the contact points. As each weld has the same number of cycles of current, a high degree of uniformity of welds is obtained.



Architects Hear Talk on Stainless Steel

Dr. Walter M. Mitchell, metallurgical engineer of the subsidiary companies of the United States Steel Corpn., discussed "Stainless Steel for Architectural Applications" before a large group of New York architects comprising the Producers' Council of New York at the Architectural League, New York, on April 6. The Producers' Council is an organization of architects and supply men, whose purpose is to bridge the gap between architectural design and use of materials.

Steel Institute to Meet in New York May 25

The American Iron and Steel Institute will meet at the Hotel Commodore, New York, on Thursday, May 25, the first time since May of last year, the usual autumn session having been omitted because of business conditions. The May meeting will also be the first since Robert P. Lamont, former Secretary of Commerce, became president.

Ohio River Shipments of Steel Up in March

Movement of iron and steel products on the Ohio River in the Pittsburgh district amounted to 32,917 net tons during March as compared with 23,614 tons in the preceding month, and 33,254 tons in March, 1932. According to the United States Engineer office, Pittsburgh, Monongahela River steel traffic in March totaled 19,546 tons, as compared with 23,614 tons in February, and with 32,234 tons in March of last year. Allegheny River steel shipments were 425 tons in March, 1656 tons in February, and 550 tons in March, 1932.

Chart for Classifying Steel by Grain Size

A standard grain-size chart for classification of steels has been adopted tentatively by the American Society for Testing Materials, 1315 Spruce Street, Philadelphia, and has been printed for distribution. A price of 25c. has been set for a single copy, but special prices will be quoted on quantity orders.

The tentative standard is known as E-19-33T and is the result of laboratory experience extending over a period of ten years. The grain-size determinations are used in connection with S. A. E. and allied steels. Those previously followed have resulted in confusion. The chart of the standards gives nine sets of photomicrographs at 100 magnifications in steps according to the number of grains to the square inch for hypoeutectoid and hypereutectoid steels.

Reinforcing Steel

Awards 520 Tons—New Projects, 1365 Tons

Philadelphia, 125 tons, two-story addition to Federal Reserve Bank, to Gilmour Steel Products Co., Philadelphia.

Pottstown, Pa., 125 tons, sedimentation basin for waterworks plant, to Kalman Steel Corpn.

San Francisco, 269 tons, Bayshore Highway, to Soule Steel Co.

NEW REINFORCING BAR PROJECTS

Lowell, Mass., 100 tons, brewery.

Brooklyn, 366 tons, sewer project on Avenue L; P. Tomasetti Contracting Corpn., low bidder for general contract.

Dannemora, N. Y., 460 tons; Lowman Construction Co., Elmira, N. Y., low bidder.

Sheboygan, Wis., 550 tons, court house; bids close April 26.

State of Indiana, 1000 tons, road slab and bridge work; bids opened April 18.

San Francisco, 650 tons, county jail; Anderson & Ringrose low bidder.

Kern County, Cal., 119 tons, State paving; bids under advisement.

State of California, 133 tons, highway bridges in Santa Clara and Santa Barbara counties.

Glendale, Cal., 425 tons, Chevy Chase reservoir; all bids rejected, steel to be bought in open market.

Pipe Lines

Consolidated Gas, Electric Light & Power Co., Baltimore, Md., plans installation of 4-in. welded steel gas pipe line from Mount Pleasant to Westminster, Md., about 10 miles.

Sinclair-Prairie Pipe Line Co., Tulsa, Okla., plans installation of 12-in. welded steel pipe line from point near Teague, Tex., to Houston, Tex., about 150 miles, for crude oil service for refinery at Sinco, near Houston.

Board of District Commissioners, District Building, Washington, asks bids until May 1 for 678 ft. lin. ft. 22-in. steel pipe for water service.

Tacoma, Wash., is arranging waterworks expansion and improvement program, cost about $1,000,000, to include 7500 lin. ft. of 54-in. steel pipe, 8050 lin. ft. of 52-in. steel or concrete pipe (alternative bids), 2850 lin. ft. 63-in. steel or concrete pipe, all to replace present wood stave pipe lines; also for new lines, 33,500 ft. of 54-in. steel or concrete pipe, and 11,000 ft. 42-in. steel or concrete pipe.

Carson Indian School, Stewart, Nev., rejected bids recently received for 1055 ft. 4-in. welded steel pipe, and contemplates call for new bids soon.

ABOVE is the announcement sent to its friends by one of America's pioneer metal-working plants, about to enter the century class. It is engraved in Spencerian script, reminiscent of the days of long ago. The Iron Age, a youngster of 78, offers its felicitations to this elder brother, whose accomplishments it has recorded for so many years.

Cast Iron Pipe

Milton, Mass., has placed 450 tons with Warren Foundry & Pipe Corpn.

Stoneham, Mass., has placed a round tonnage with Warren Foundry & Pipe Corpn.

Montrose, N. Y., has awarded 2100 tons of 6- to 16-in. to R. D. Wood & Co.

Quartermaster, West Point, N. Y., asks bids until April 26 for 326 ft. 12-in. cast iron culvert pipe, and quantity of special castings (Circular 104).

Buffalo, Ohio, has awarded general contract for 35,000 ft. of 2- to 8-in.

St. Louis has opened bids on about 3000 tons of 6- to 20-in.; National Cast Iron Pipe Co., American Cast Iron Pipe Co., United States Pipe & Foundry Co. and McWane Cast Iron Pipe Co., low bidders on various tonnages.

Livermore, Cal., has awarded 125 tons to West Coast Construction Co.

MachineryClub,NewYork 25 Years Old

The Machinery Club of New York will celebrate its twenty-fifth anniversary Thursday evening, May 4, at its club rooms at 50 Church Street. A dinner for members and guests, with entertainment, will mark the occasion.

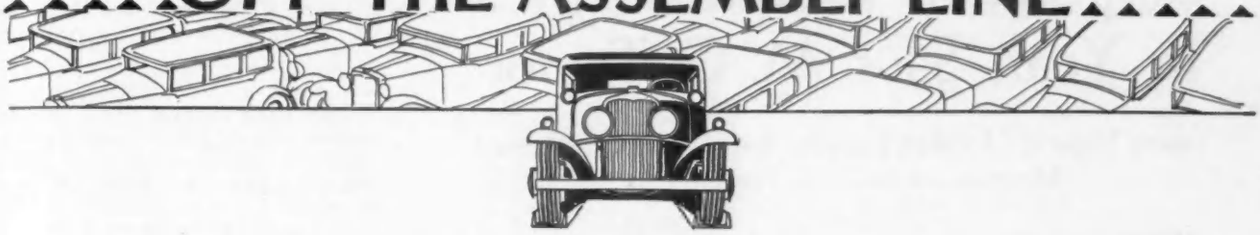
President Reduces Duty on Some Farm Tools

WASHINGTON, April 14.—President Roosevelt's first tariff proclamation provides for a decrease in the duties on hay forks and four-tined manure forks from 8c. each and 45 per cent ad valorem to 4c. each and 22½ per cent, and on other agricultural forks, hoes and rakes from 30 per cent to 15 per cent. The decreases become effective on May 3 and represent the maximum slash of 50 per cent under the Hawley-Smoot tariff act. The changes were made upon recommendation of the Tariff Commission.

Railroad Equipment

Shipments of railroad locomotives in March totaled 69 units, of which 67 were electric and two steam type, all for domestic use. Shipments in February totaled 65, 63 electric and two steam, also for domestic use.

OFF THE ASSEMBLY LINE



Motor Car Makers Press Suppliers for Deliveries as Production Increases

DETROIT, April 17.

THE high production pace attained by the automobile industry a week ago has been further accelerated in the last seven days. The way in which some plants are operating overtime and are pounding steel mills and parts makers for rush deliveries of materials reminds one of pre-depression days. Steel releases by the three leading makers—Ford, Chevrolet and Chrysler—have been of substantial proportions. Since early the past week the local steel plant has been running at 100 per cent of ingot capacity and its finishing mills have been on fairly heavy schedules. As sales figures come in from dealers throughout the country, factories are convinced that the spring season, although delayed, will be much better than anticipated.

Ford Output 2500 a Day

The Ford Motor Co. has increased its output at its Rouge plant to 2500 units a day. Its demands on some of its parts suppliers have been so large that they were compelled to operate seven days the past week. Briggs and Murray are working six days a week on Ford bodies. One important parts manufacturer this month has received two releases from Ford, one for about 50,000 parts (one part to a car) and the other for 40,000. It is understood that retail sales of the new V-eight car have improved so much in the last few weeks that production is being pushed with the hope that April assemblies will surpass the 48,000 mark recently set as the objective. It is expected that the combined output for this month and next will be considerably higher than the 100,000 units which Ford is said to have decided upon at the beginning of April.

Chevrolet's steel purchases have covered its requirements not only for the remainder of April, but also for the first half of May. Steel releases for the latter half of next month will be placed in a week to 10 days. Practically all Chevrolet manufacturing and assembly plants are continuing to operate five days a week. The gray iron foundry at Saginaw, which makes cylinder blocks for Chevrolet and Pontiac, is pouring 1100 tons of castings a day. It is believed that Chevrolet's assemblies in April will be about 60,000 cars, a large majority of which will be of its Master series. It is still counting on turning out 60,000 cars next month. However, this is subject to sudden change according to the swing which retail sales may take this month. Chevrolet dealers probably will want to carry through the spring season without increasing stocks much beyond the present point, which is four or five cars per dealer, and therefore factory schedules will be held rigidly within the bounds of retail sales.

Plymouth Working Overtime

Plymouth's activities have been further intensified, with some departments working 24 hr. a day seven days a week. The assembly line as well as many departments operated on Saturday and Easter Sunday in an endeavor to get enough of the new 112-in. wheelbase cars into the hands of dealers to take care of the spring trade. The factory is understood to have on hand unfilled orders for 19,000 cars. For the last two weeks it is reported that only 112-in. wheelbase cars have been coming off the assembly line, although Plymouth officials have stated that they are committed to two lines of cars. The price of the business coupe of both the 108-in. and 112-in. series is $495. It is said that Plymouth production has reached the point where there is no longer room in the Mount Elliott Avenue plant for both Plymouth and De Soto assemblies. Consequently assembly of the De Soto car in the Dodge truck plant on Lynch Road adjacent to the Plymouth factory is contemplated. Dodge is going ahead on a basis of 400 cars a day, five days a week. Chrysler steel specifications, especially for the Plymouth and Dodge divisions, were of large proportions the past week. Several foundries in southern Michigan are exceptionally busy on castings for the Chrysler companies.

Reo will introduce shortly a new passenger car without a gear-shift lever. It is the result of a revolutionary invention by H. T. Thomas, Reo's chief engineer. The new device has been tested in all parts of the United States during the last two years and is now considered foolproof.

Factory Shipments Gain

For the two weeks ended April 8, Hudson-Essex dealers delivered 1352 cars, as against 961 in the preceding fortnight. Factory shipments to dealers amounted to 1386 units. Orders on hand at the factory total 2074 cars. It is noteworthy that recent sales have shown a sharp gain in the class of cars immediately above the lowest-price range, such as the Pontiac and Dodge. Cadillac reports that sales of its 12-cylinder cars are running ahead of expectations. Pierce-Arrow's deliveries of its twelves have been larger this year than last. Rockne deliveries from Studebaker's South Bend plant, to which all production has been moved from Detroit, are scheduled to start today. The first of Continental's highest-priced car, the Ace, came off the line at Grand Rapids last week. Studebaker now has 5000 men employed and will carry over 900 orders into May. Willys-Overland receivers have been granted permission to continue work on trucks for the International Harvester Co. through June. There are now 1800 men employed at the Willys-Overland plant.

The increased manufacture of motor cars has resulted in much heavier foundry operations in this district. A leading pig iron company expects to ship twice the tonnage this month that it did in March. Water deliveries of steel to Detroit from Cleveland have been resumed on a regular basis, but shipments from Chicago will not get under way until about May 1. It is anticipated that the percentage of steel moved to Detroit by water this year will be the largest on record.

Hudson has entered the light delivery field with a half-ton commercial car on a 106-in. wheelbase.

Corporation Output Highest in Year, Says M. C. Taylor

Voices Hope for Further Business Improvement at Annual Meeting—Announces Pension Cut

ANNOUNCING that the operations of the Steel Corporation have advanced to 21 per cent of capacity, the highest rate since March, 1932, Myron C. Taylor, chairman of the board, told stockholders at their annual meeting in Hoboken, N. J., April 17, that he was hopeful of "better things" to come. He warned them, however, against false optimism and urged them "not to infer more from this than we do."

He also reported a downward revision of the company's pension plan, effective May 1. The reduction in pensions, he said, will range from 25 per cent in the higher brackets to 5 per cent in the lower. Some of the pensions in the lowest group which, it was felt, could not be cut are exempted from the new provisions.

The pension reduction, he explained, was decided upon with the "utmost reluctance" and followed other measures affecting both stockholders and active employees.

"We have by steps resisted the decline in business and earnings by timely, modest but necessary reductions, first in salaries, next in wages and dividends, and in eliminating any thought of bonus compensation, because there is none unless profits exceed $100,000,000 in a single year; there has been none for the last two years and there probably will be no occasion to discuss one this year."

He explained that the three salary cuts made by the corporation during the depression had totaled 40 per cent. Job-sharing had been carried to a point, he stated, where there were practically no full-time workers left in the company's ranks. "We have carefully distributed work among those in our employ, and we have kept in our employ all workers for whom work could be found. Where work could not be found for the men the corporation contributed some money to the assistance of the unemployed in the communities in which it operates.

"There is a harmony, a mathematical basis, almost an exact justice in the way we have adjusted our income to our stockholders and our employees. We hope we won't have to do any more, and that we can shortly turn the tide the other way," he declared.

In response to a suggestion of a stockholder that the meeting go on record as supporting the various economic measures taken by the Roosevelt administration, Mr. Taylor introduced a resolution to that effect, which was adopted.

"I am glad to offer such a resolution," he declared. "I have a great hope, and believe with you, sir, that we are on our way to better things. We should rally under this banner without regard to party to save this country of ours. We have always supported the Presidents of our country, but I gladly put this resolution."

OBITUARY

AUGUSTUS F. MEEHAN, president of the Ross-Meehan Foundries, Chattanooga, Tenn., died after a long illness in the Good Samaritan Hospital, Cincinnati, on April 15. He was born in Covington, Ky., Feb. 17, 1872. After his graduation from Notre Dame University in 1890, he became identified with the Southern Malleable Iron Co. Later he was made general manager of the Elliott Car Co., Gadsden, Ala., from which he resigned to engage in mining and foundry work in Mexico, where he was president and general manager of the Monterey Foundry Co. from 1895 to 1903. He returned to the United States in 1903 to become vice-president and general manager of the Ross-Meehan Foundry Co. He subsequently was made president. Under his management the company built an electric steel foundry which was practically 100 per cent electrically equipped [described in THE IRON AGE of June 17, 1926]. Mr. Meehan also organized and was made president of the Meehanite Metal Corpn., which developed and marketed Meehanite metal, a high-tensile cast iron described in THE IRON AGE, May 27, 1926. Meehanite is now manufactured under license by foundries throughout the country.

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NESTOR GERMEAU, general director of the Societe Anonyme des Forges de la Providence, Marchienne-au-Pont, Belgium, died on March 16.

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ALBERT MOHR, president of John Mohr & Sons, Chicago, boiler manufacturers, and a former member of the South Park Board, Chicago, died March 29, aged 72 years. He had been ill since last August.

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CHARLES T. LUNTZ, vice-president of the Luntz Iron & Steel Co., Canton, Ohio, dealer in scrap iron and steel, died in an Akron, Ohio, hospital on April 11, following injuries sustained in an automobile accident on April 8. He was widely known in the scrap trade, having been in charge of his company's Cleveland and Pittsburgh offices for a number of years prior to 1924, when he took up his residence in Canton.

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FRANCIS WATKINS KEEN, deputy chairman and joint managing director, Guest, Keen & Nettlefolds, Ltd., England, died April 14, aged 69 years.

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JOHN H. VICTOR, JR., vice-president of the Victor Mfg. & Gasket Co., Chicago, son of the head of that concern, died April 7 at his home in Evanston, Ill. He was 21 years old.

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RUSSELL E. PUERNER, assistant professor of machine design, College of Engineering, University of Wisconsin, Madison, died April 4, aged 38 years. He was born in Jefferson, Wis., and was a graduate of the university.

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HERMAN E. FRENTZEL, chief mechanic, Falk Corpn., Milwaukee, for 22 years, and previously shop superintendent, Harnischfeger Corpn., for 20 years, died April 12, aged 68 years. He was a native of Germany, where he learned the machinist's trade. For some years Mr. Frentzel was a partner in the Julius Busch Co., Milwaukee, general machinist firm.

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GUSTAV A. LINDSTROM, mechanical engineer and inventor, Green Bay, Wis., died April 5, aged 61 years. He was born in Sweden and came to America in 1892. Mr. Lindstrom was formerly general superintendent, Menominee Motor Truck Co., Menominee, Mich., and later served in the same capacity for the Oneida Motor Truck Co., Green Bay.

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J. W. LINK, for many years chief hydraulic engineer of the Byllesby Engineering & Management Corpn., Chicago, died after a long illness on April 14.

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WILLIAM F. RUSSELL, formerly managing director of the steel plant of Isaac G. Johnson & Co., New York, died in the New York Hospital after a month's illness on April 12, aged 55 years. He was at one time vice-president of the Bucyrus Co., and after its merger he became a director of the Bucyrus-Erie Co.

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WILLIAM S. SHELOW, metallurgist with the Semet-Solvay Co. plant in Cincinnati, died at his home in that city on March 21. Mr. Shelow was employed for many years as metallurgist for the American Pig Iron Warrant Co., New York. He later became identified with Eaton-Rhodes & Co., which he left 10 years ago to go with the Semet-Solvay Co.

... PERSONALS ...

C. H. REYNOLDS has been elected president of the Sheffield Machine & Tool Co., Dayton, Ohio, manufacturer of precision gages. Long associated with the Sheffield company and with the City Machine & Tool Works, Dayton, he will have his offices in Detroit, where he has been located for many years. O. M. POOCK, president, City Machine & Tool Works, has become treasurer of the Sheffield company, and LOUIS POOCK, general manager City Machine & Tool Works, has been made Sheffield's vice-president and general manager.

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LOUIS C. BIHLER, for many years general traffic manager of the Carnegie Steel Co., Pittsburgh, will retire on April 30, after 38 years with the Carnegie company and an even half century in traffic and transportation work. Following 12 years' service with the Erie and the Cotton Belt railroads, Mr. Bihler joined the Carnegie Steel Co. on April 1, 1895, as assistant to the general freight agent. Later he became assistant general freight agent, then assistant traffic manager and on Jan. 1, 1904, he succeeded George E. McCague as traffic manager. On Jan. 1, 1907, he also was appointed Eastern traffic manager of Universal Portland Cement Co., which title he held until Jan. 31, 1929. In May, 1928, Mr. Bihler was appointed assistant to the president and general traffic manager of the Carnegie company, and on Sept. 30, 1932, he retired from active traffic work and was assigned to special duties. Mr. Bihler has been active in the Pittsburgh Traffic Club, the pioneer organization of its kind, having served as president in 1906, as chairman of the board, and as a member of the board of governors for six years.

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W. W. SPANAGEL has been appointed Cleveland district manager for the Reliance Electric & Engineering Co., Cleveland. He has been acting in this capacity for several months.

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R. E. HELLMUND, since 1921 engineering supervisor of development for the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed chief engineer. He is the first Westinghouse executive to hold this office since the death of B. G. Lamme in 1924. Born in Gotha, Germany, Mr. Hellmund was graduated from Charlottenburg University in 1899 with the degree of electrical engineer. After several years spent in laboratory work and in designing electrical machinery, both in Germany and the United States, he joined the Westinghouse Electric company in 1907. H. W. COPE, formerly assistant director of engineering, has been made assistant to the vice-president, responsible for the coordination of certain headquarters engineering departments and district office engineers. He has been identified with the Westinghouse organization continuously since his graduation from Purdue University in 1898.

C. H. REYNOLDS

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ADAM M. STEEVER, formerly identified with the Buick and Chevrolet motor divisions of the General Motors Corpn., has been made vice-president in charge of technical operations of the Lindberg Steel Treating Co., Chicago.

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FRANK CORDES, president, Lewis Foundry & Machine Co., Groveton, Pa., subsidiary of the Blaw-Knox Co., Blawnox, Pa., has been elected to a similar position with the Union Steel Casting Co., Pittsburgh, also a subsidiary of the Blaw-Knox organization. Mr. Cordes succeeds MERRILL G. BAKER, who is no longer identified with the Union company. J. R. DUNSFORD remains as chairman of the board. B. F. MERCER, vice-president and general superintendent, is no longer identified with the company.

L. C. BIHLER

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GEORGE S. CASE has resigned as president of Peck, Stow & Wilcox, Southington, Conn., and has been succeeded by MARK J. LACEY, of New Britain, Conn. Mr. Lacy will also be general manager.

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FRED B. JACOBS, who has been identified with the abrasive industry for the past 25 years, has become general sales and advertising manager of the abrasive division of the Cleveland Container Co., Cleveland. He was at one time associated with the Carborundum Co. and with the Abrasive Co., and was editor of *Abrasive Industry* from 1920 to 1932.

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R. A. VAIL, formerly in charge of production at Detroit for the Rockne Motors Corpn., subsidiary of the Studebaker Corpn., has been transferred to South Bend as factory manager for the Rockne company, which has consolidated all manufacturing activities at Studebaker's South Bend works.

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F. H. WILLCOX, vice-president, Freyn Engineering Co., Chicago, has returned from an 11 months' trip abroad in which he visited England, the U. S. S. R. and other European countries.

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MYRON H. WEAVER, who resigned recently as general superintendent, Southside Malleable Casting Co., Milwaukee, has formed new connections with the Glancy Malleable Corpn., Waukesha, Wis.

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FORREST NAGLER, mechanical engineer, formerly associated with the A. O. Smith Corpn., Milwaukee, has joined the staff of the Allis-Chalmers Mfg. Co., Milwaukee, as representative with headquarters at Toronto, Ont.

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NEIL C. HURLEY has been elected president of the Independent Pneumatic Tool Co., Chicago. He succeeds RALPH S. COOPER, who has been made vice-president in charge of Eastern operations, with headquarters in New York.

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JAMES WINSTON, formerly chief engineer of the Elizabeth Iron Works, Inc., Elizabeth, N. J., in charge of engineering and sales, has opened an office at 558 Pedley Street, San Bernardino, Cal., as a consultant in structural work in steel and other metals.

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JOHN BEARD has become identified with the Haveg Corpn., Newark, Del., maker of corrosion-resistant chemical equipment. Mr. Beard was at one time associated with the Sharples Specialty Co., Philadelphia.

... LETTERS TO THE EDITOR ...

The 30-Hr. Week in Small Plants

Editor, The Iron Age:

The writer is particularly interested in the articles appearing in your last issue regarding the Thirty-Hour Five Day Week Bill.

There is one point that is not brought out and in fact has not been brought out in any article or discussion coming to the writer's attention and that is that the bill seems to be founded on a conception that all manufacturing industry is of large proportions, like the large cotton mills and silk mills and automobile manufacturers. As I understand it, the preponderance of industrial manufacturing enterprises in this country are those employing a relatively small number of workers in the production department. Mr. John Bantry, in his recent article in the Boston Sunday Post, set the number at 100 workers. I feel positive of having seen an article or a statement attributed to Mr. Edgerton, recently President of the National Association of Manufacturers, to the effect that a great preponderance of manufacturing enterprises are those employing fifty or less. A small working organization of this type is rather inflexible and is frequently called upon to operate under conditions where overtime is required but the policy of a second shift would be impracticable if not impossible. Our concern is numbered among such enterprises. In normal times we should employ among our production and service workers and maintenance men, somewhere about 100. Today the number is greatly reduced. With the best oversight with which we are endowed, occasions arise where it is necessary to do emergency overtime work. This may be because we receive some article like a casting or merchandise later than was promised, let us say, to go out by Merchants & Miners to a Southern mill. A few hours with one or two men will accomplish the result, help us fulfill the promise, help our customer get his goods on time, help his employees who are dependent upon our shipment to get to work as hoped for. Under the present scheme, we can secure the cooperation of whatever number of men are necessary, including stock room clerks, shipping room force and truckmen to accomplish that purpose. Under the Black bill, unless there is some amendment in force or proposed not yet brought to my attention, we must produce from somewhere another shift, including the employees mentioned. Now can Mr. Black or anyone sponsoring the bill, tell us where we are going to get that second shift? We cannot afford to keep on retainer, a reserve force of men for such emergencies. We cannot go out into the highways and byways and gather them in. If we can go into the highways and byways, the chances are that we should not increase employment in the gross, because the kind of men we should require would undoubtedly be men who already had done their day's stunt in some other workshop or manufacturing establishment.

There is a point which does not seem to be at all covered, likewise it is a point which has its possibilities. You may recall that during the Big War, when wages were at a high premium level, men used to augment their earnings by working eight hours in one shift and then securing eight hours work in another concern, leaving eight hours for rest and recuperation. I have been creditably informed of one bright young man, who was a journeyman barber by trade who worked one shift each in two factories and then augmented his pitiful wage by doing barbering on the side, or if you prefer, tonsorial engineering and thereby supplementing his meagre pittance. Ultimately I believe a stop was put to doubling up of the factory workers so that a man could only work one shift a day in productive enterprise but before that restriction was invoked, I was assured that the practice recounted was not at all unusual and so far, as I can see, is entirely permissible under the Black bill, which only prohibits the shipment in Interstate Commerce of *goods produced in a factory in which* the workers have worked more than six hours a day, or more than five days per week of six hours each. There is nothing in the bill to prevent the opportunist from getting employment in our factory in the morning shift and securing employment in some other factory that is operating a second or third shift. If many do that, what becomes of the equable distribution of labor?

One point that we have been preaching to our Congressmen and Senators and Secretary of Labor is the application of the legislation beyond production workers. According to a strict interpretation of the original bill, we should have to have three day men where we now have one, and we should have to have three night men, where we now have one. If we make no change in budget allowance for that type of maintenance, each of the three men receives a below-subsistence level of wage. If we must employ three men for each tour of duty and pay each man for a third of a day, what we now pay one man for a full day, our maintenance charge is increased beyond all reason. Likewise, if in the instance first recited, we must run two or more shifts of so-called non-productive workers, such as stock room clerks, foremen, pivot men and the like, that is going to help add to our burden or overhead.

Mr. Bantry in his discussion, above referred to, refers to labor as the larger factor in production. If he means the major factor of expenditure in a manufacturing enterprise, that I believe, is quite incorrect. If we should cut our limited force of factory workers 10 per cent, the ultimate effect would be inappreciable. Today, our main cost is overhead or burden. We have to maintain our sales force; it costs us for salesmen's salaries; it costs us for travel; it costs for hotel expenses. We believe that our men are bringing these charges down to the lowest possible level. We can see nothing in the 30-hr. bill that is going to stabilize our industry, increase its output or add one jot or tittle to the employment in this factory. From conversation, the same applies to other factories similarly constituted.

E. C. SMITH, *President,*
Rhode Island Warp Stop Equipment Co.

British Iron and Steel Output Up in March

LONDON, ENGLAND, April 15. (*By Cable*)—British pig iron output in March gained more than 22 per cent over that of February, and steel ingot production increased nearly 20 per cent. The pig iron total was 332,200 tons against 270,800 tons in February and 286,600 tons in January. The steel ingot total was 577,700 tons against 482,700 in February and 444,400 tons in January.

Monthly totals for 1932 and 1933 follow:

1932	Pig Iron	Steel Ingots
Jan.	332,400	429,700
Feb.	318,100	480,600
March	335,600	462,800
April	316,900	433,300
May	315,300	416,900
June	311,400	459,300
July	292,600	430,300
Aug.	259,400	361,500
Sept.	260,400	430,300
Oct.	275,600	438,500
Nov.	267,700	473,800
Dec.	284,500	430,400
	3,569,900	5,247,400
1933		
Jan.	286,600	444,400
Feb.	270,800	482,700
March	332,200	577,700

Canadian production from the sheet metal products industry in 1931 was valued at $39,039,005, a decline of 17 per cent from the 1930 total of $47,067,479, according to the Dominion Bureau of Statistics. Imports of stamped and coated products into Canada in 1931 amounted to $1,722,825, mostly from the United States. Exports of enamelware and tinware in that year were appraised at $42,875.

Shipments of T-rail track of 60 lb. per yd. and heavier in March were 2013 tons, according to the monthly report of the American Iron and Steel Institute, compared with 1822 tons in February and 1984 tons in January. The total for the quarter was 5819 tons against 8930 tons in the first quarter of 1932.

Hoover Dam Penstocks To Be X-Ray Inspected

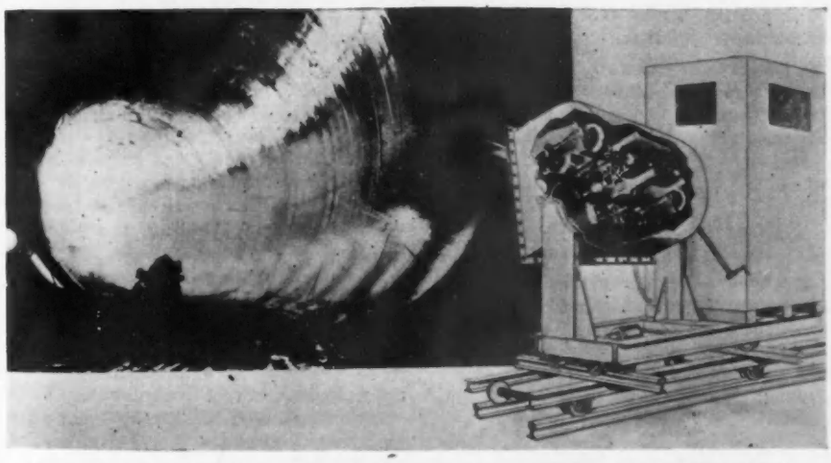
A GIGANTIC application of industrial X-ray work will shortly get under way. It will be the inspection of every inch of steel welds for a distance of more than 75 miles in the penstocks for Hoover Dam. A special shock-proof apparatus rated at 300,000 volts has been developed for the job by engineers of the General Electric X-Ray Corpn. · The apparatus, built in Chicago, is now on location at the dam site.

Complete safety in dealing with such high voltages, space limitations, and necessarily easy portability made the development of the apparatus difficult. When the penstock contract for the dam was awarded to the Babcock & Wilcox Co., Barberton, Ohio, it was with the provision that all fusion welds pass X-ray inspection. The penstock sections range from 8½ to 30 ft. in diameter, and the thickness of the steel is 3 in. in many places. These large sections will be welded circumferentially and longitudinally, a job calling for a minimum of 159,000 separate X-ray exposures, involving the use of more than 24,000,000 sq. in. of X-ray film.

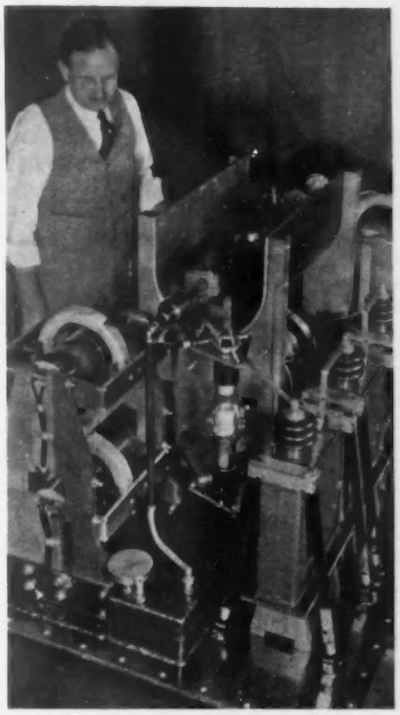
To cope with this unusual problem and keep up with the planned construction schedule, X-ray apparatus of a new type was necessary Rated at 300,000 volts and 10 milliamperes for continuous operation, it is capable of producing radiographs of welded steel plate of 4-in. thickness.

The high voltage required to produce X-rays of such penetrating power made the safety factor important in development. It will be impossible for anyone to come in contact with the high-tension system while operating. This electrical safety is obtained by immersing the transformer, condensers, Kenotron tubes, and the X-ray tube itself in oil, within a sealed and grounded tank. The tank has adequate internal lead shielding to insure perfect X-ray protection as well. A single cable bringing the low-tension power supply is the only electrical connection.

The apparatus consists of three units—a shock-proof head weighing 5000 lb., the operator's control unit, and an expansion tank. The anode of the X-ray tube will be cooled by oil, circulated by a motor-driven pump. The head will be mounted on a special mechanical carriage so designed that it can work inside or outside of the penstock, traveling on a narrow-gage track.



Penstocks at the Hoover Dam, in part as large as 30 ft. in diameter and made of steel as much as 3 in. thick, are to be inspected as to the welding by means of the X-ray. The sketch shows how the portable apparatus devised will be used.



The X-ray apparatus provides 10 milliamperes at 300,000 volts. The high-voltage system was built by the General Electric X-Ray Corpn. and is here shown before it was covered up in a container so it could be immersed in oil and the whole rendered shock-proof and highly portable for transport on a narrow-gage track.

Thirty-Hour Week in the Steel Industry

(Concluded from Page 614)

times of depression these added workers would entail a further burden on the private welfare and relief departments of steel companies, and possibly serve to create a more serious situation than exists at the present. Steel workers are generally not of a migratory character, and their employment in other industries not so seriously depressed would be difficult.

The average laborer in the steel mill would not welcome a shorter working period under present conditions, nor in times of normal production. Steel companies are naturally not now prepared to advance wage rates, thus increasing the unit cost, and the worker would not expect to receive the same net return for 6 hr. as he does now for 8 hr. To accomplish this a 25 per cent increase in wages would be necessary, a move which could not be undertaken under current unprofitable operating conditions. Nevertheless, as business returned to normal, wages would have to be increased very sharply if a desirable standard of living were to be maintained on a 30-hr. work week.

The present base rate for common labor in the steel industry is 33c. an hour. The laborer of this class normally works 10 hr. a day, and would be rather fortunate in ordinary times if he secured six days each week. His net wage would thus be $19.80 for the week. Under the present scale, his wage for a 30-hr. week would be limited to $9.90. If the rate were increased by 50 per cent or, say, to 50c. an hour, he would receive only $15 a week. This, of course, is the extreme case, although the comparisons would probably hold in the case of semi-skilled and skilled labor. An increase of nearly 100 per cent in the wage rate would be necessary to provide even skilled mill workers with a wage sufficient to maintain a fairly satisfactory standard of living, especially if prohibition of overtime work were rigidly enforced. It seems quite certain that the steel industry would not be in a position to make such upward adjustments in wages for a long time, unless selling prices of finished steel products were very sharply advanced.

It would seem that the economic results of the proposed compulsory 30-hr. week would hardly justify any immediate benefits which might be obtained by further diffusion of wages.

Water Competition To Bring Lower Freight Rates to Gulf Ports

WASHINGTON, April 18.—Reduced rail and barge rates on iron and steel products in carloads, from Southeastern points to Texas gulf ports will be approved by the Interstate Commerce Commission, it is stated in a report announced last Thursday, provided rates are further reduced from St. Louis and Newport, Ky. The commission held that proposed schedules fixing proportional rates to and from New Orleans and Baton Rouge, La., would result in undue preference of the Southeastern interests and undue prejudice to the Newport and St. Louis interests. The lower rates were sought on account of water competition.

Rates in cents per 100-lb., which the commission said it would approve, are:

To New Orleans
(Proportional Rates)

From	Rail	Barge or Rail-Barge
Birmingham	20.0	16.0
Anniston, Ala.....	20.0	16.0
Atlanta, Ga.....	23.0	19.0
Knoxville, Tenn...	25.5	21.5
St. Louis.....	22.5	18.0
Newport	30.0	24.0

To Houston, Tex.
(Through Rates)

From	All-Rail	Barge-Rail or Rail-Barge-Rail
Birmingham	40.0	36.0
Anniston	40.0	36.0
Atlanta	43.0	39.0
Knoxville	45.5	41.5
St. Louis	42.5	38.0
Newport	50.0	44.0

Birmingham, St. Louis and Newport are served by water lines. The approved through rates are based on a proportional rate beyond New Orleans of 20c. per 100 lb.

The slashes generally are heavy. Indicative of the cuts is a reduction of 14c. to 20c. from 34c. in the all-rail proportional rate from Birmingham to New Orleans, while the barge or rail-barge rate would be reduced 11c. to 16c. from 27c. From St. Louis to New Orleans the proportional rail rate would be cut 26c. to 22.5c. from 48.5c. and the barge or rail-barge rate would be cut 21c. to 18c. from 39c.

The Birmingham-Houston through rail rate would be cut 30c. to 40c. from 70c. and the barge-rail or rail-barge-rail rate would be reduced 9c. to 36c. from 45c. The Birmingham-St. Louis through rail rate would be cut 31.5c. to 42.5c. from 74c. and the barge-rail or rail-barge-rail rate would be cut only a half-cent to 37.5c. from 38c.

The commission pointed out that rates by water between South Atlantic and Gulf ports range from about 17.5c. to 20c. and that the reduced proportional rate beyond New Orleans and the resulting reduced through rates from the Birmingham district are proposed for the express purpose of meeting water competition. The rates to New Orleans via barge and rail-barge were made by deducting 20 per cent from the port-to-port proportional rail rates. Means of making other proposed reductions also are outlined.

Competition at the Texas gulf ports, it is stated, is extremely keen among producers and carriers, both foreign and domestic. In 1931 the import and coastwise shipments of iron and steel articles into the Texas ports amounted to 38,958 tons and 219,483 tons respectively. In 1932 about 83,000 tons moved by private barges from the Birmingham district. The movement from the Southeast to the Texas gulf ports over the rails of the Louisville & Nashville and the Southern railroads to New Orleans in the vessels of water lines beyond was 13,341 tons in 1930; 12,647 tons in 1931 and 8036 tons in the first 10 months of 1932. From New Orleans to the Texas gulf ports the Texas & New Orleans Railroad and the lines of the Missouri Pacific handled 23,423 tons in 1928; 9778 in 1929; 10,358 in 1930; 6144 in 1931 and only 937 tons in the first 10 months of 1932.

Steel Executives See Better Business Ahead

Stockholders of the Bethlehem Steel Corpn. and the Republic Steel Corpn. at their annual meetings last week were told that steel business has begun to improve and that the outlook is more hopeful. Eugene G. Grace, president of Bethlehem, said that he did not know whether recent improvement was brought about by an accumulation of orders during the bank holidays or by real improvement in business conditions.

Charles M. Schwab, chairman of Bethlehem, said that "we must resume going onward and upward." He added that he did not know how long it would take to "come around, but we must come around; things must get better."

Tom M. Girdler, of Republic Steel, expressed the belief that the recent rebound in steel operations is the beginning of a general improvement. He said that in February the Republic company had a 23½ per cent operation, and on that basis came out about even on a cash basis. In March the company's operations dropped as low as 12 per cent. Mr. Girdler said that with present prices Republic could make money at a 35 per cent operation and with operations at about 25 per cent could show a gain in its cash position.

"I think 1933 is going to be a much better year than 1932," Mr. Girdler said. "I think there will be losses in the industry, but not as great as in 1932."

Foundries Complain of Freight Rates on Sand

WASHINGTON, April 18.—Complaints against rates on industrial sand have been filed with the Interstate Commerce Commission by foundry operators in the East. The rates are alleged to be unreasonable. Lower rates in the future and reparation on shipments in the past are asked. The originating points are in New Jersey and New York, the rates varying $1.75 to $3.40 per net ton. The foundries are: Campbell Foundry Co., Harrison, N. J.; Standard Foundry Co., Worcester, Mass.; Chemung Foundry Corpn., Elmira, N. Y., and Roselle Park, N. J.; Lehigh Foundries, Inc., Easton, Pa., and Colebrookdale Iron Co., Colebrookdale, Pa.

Welding Society to Meet April 27 and 28

This year's annual meeting of the American Welding Society will be held at the Governor Clinton Hotel, New York, April 27-28. It will open with a business session, which will be followed in the afternoon by discussion of reports to be presented by the pressure piping code committee and the committee on the use of welded steel parts for machinery construction. A lecture on "Erecting Steel Buildings and Strengthening Steel Bridges by Welding," by Prof. F. P. McKibben, consulting engineer and president of the society, will feature the evening session.

Charles F. Abbott, executive director, American Institute of Steel Construction, will speak on "Must Industry be a Pawn or a Power?" at the opening session April 28. "Welding—a Factor in Industrial Revival," will be discussed by W. T. Chevalier, publishing director, *Engineering News Record* and *Construction Methods*. The afternoon will be devoted to the annual meeting of the American Bureau of Welding, the research department of the A.W.S., at which a number of committee reports and fundamental research progress reports will be presented.

American Steel Warehouse Association will hold its twenty-fourth annual meeting at the Hotel Commodore, New York, on May 23 and 24. B. R. Sackett, 505 Arch Street, Philadelphia, is secretary.

SUMMARY OF THE WEEK'S BUSINESS

Steel Output Rises to 23 Per Cent, Highest Rate in a Year

Orders More Diversified, Though Automobile Tonnage and Tin Plate Releases Are Paramount—Scrap Higher—Southern Pig Iron Advanced

STEEL ingot production this week has risen to 23 per cent of the country's capacity from 19½ per cent last week, and may be further increased within a few days by the starting up of the Carnegie Steel Co.'s rail mill on a recent order from the Erie Railroad. The present rate is not only the fourth consecutive weekly increase, but it is the highest in about a year and is above the monthly average for any month since March, 1932, as computed by the American Iron and Steel Institute.

The chairman of the United States Steel Corpn. on Monday announced a 21 per cent rate for the corporation's subsidiaries. Some of the smaller companies with a narrower range of products are working at considerably higher rates. Outstanding are the Detroit independent plant, which is at 100 per cent of ingot capacity, and a northern Ohio sheet producer, which is running at 50 per cent. Automobile orders are responsible for these high operations, some motor car plants having expanded their schedules to such an extent as to work overtime.

Almost every district except the Atlantic seaboard has shown marked improvement within the past week. The Pittsburgh district is now at 18 per cent, the Chicago district about 23 per cent, Cleveland is at 35 per cent, Youngstown and adjacent Ohio districts at 23 per cent and the Wheeling district at 40 per cent. There have also been gains at Birmingham and Buffalo. Aggregate orders received by some steel companies thus far in April are considerably in excess of their entire March bookings.

ACCOMPANYING the further gain in production is a strengthening of prices of raw materials, with advances in scrap in nearly all important districts averaging about 50c. a ton, which brings THE IRON AGE heavy melting steel composite up to $7.67 a gross ton, the highest since early October and slightly above the average for 1932. Pig iron prices are firmer in the principal producing districts, with an outright advance of $1 to $2 a ton on Southern iron, depending upon the destination. This rise was preceded by more widespread covering by melters than has been in evidence at any time in three years.

Makers of galvanized sheets have announced an advance of $2 a ton to 2.70c. a lb., Pittsburgh, and 2.80c., Chicago, effective at once, though it may be some weeks before the new price is tested because of contract coverage at 2.60c., Pittsburgh, for this quarter. On the other hand, the price of steel plates at Pittsburgh has declined $2 a ton, but this is a belated recognition of marked weakness that has existed for several months in the Eastern section of the country. The reduction in the Pittsburgh quotation brings THE IRON AGE finished steel composite to 1.867c., or $2.56 a ton below the average of March, 1922, the previous post-war low point. Because of the fact that the new Southern pig iron prices have not become established by sales, THE IRON AGE pig iron composite is unchanged at $13.68 a gross ton.

ALTHOUGH automobile tonnage and releases of tin plate by can manufacturers continue to be the outstanding influences in raising steel production, there are evidences of greater diversification of orders. A development of significance is the freer movement of steel out of jobbers' stocks. Some of the new steel business seems to represent delayed March demand and is plainly of a seasonal character, but there is almost a complete absence of speculative buying, except to some extent in pig iron, and virtually all orders are for immediate shipment, the urgent demands making it difficult for mills to meet delivery requirements.

It is noteworthy that the gains in steel tonnage in the past few weeks have come without material help from the railroads or from building construction. The New York Central has authorized the purchase of 9000 tons of rails, but orders have not yet been issued.

With the delay in the letting of contracts for Government projects, structural steel awards this week have shrunk to 4200 tons, and it is apparent that there will be no immediate revival of importance in construction work without Federal aid.

Thus, the heavier products, such as shapes, plates and pipe, which depend largely upon building construction, are lagging far behind the light products. Tin plate production has risen to about 50 per cent of capacity and sheet rollings range from 25 to 30 per cent. Bar and strip mill schedules are also definitely higher.

The brewing industry is contributing some orders, but many brewers are delaying plans pending a clarification of the outlook. In three issues of THE IRON AGE, including this one, brewery construction projects totaling about $17,000,000 have been listed.

The Pure Oil Co. has awarded 4000 tons of pipe to the National Tube Co. and the Youngstown Sheet & Tube Co. for a gasoline-carrying line to be built from Toledo to Detroit.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Apr. 18, 1933	Apr. 11, 1933	Mar. 21, 1933	Apr. 19, 1932
No. 2 fdy., Philadelphia	$14.34	$14.34	$13.34	$15.59
No. 2, Valley furnace	14.50	14.50	14.50	15.00
No. 2 Southern, Cin'ti	13.82	13.82	13.82	13.82
No. 2, Birmingham	11.00	11.00	11.00	11.00
No. 2 foundry, Chicago*	15.50	15.50	15.50	16.00
Basic, del'd eastern Pa.	14.09	14.09	13.50	16.00
Basic, Valley furnace	13.50	13.50	13.50	14.50
Valley Bessemer, del'd P'gh.	16.89	16.89	16.89	17.39
Malleable, Chicago*	15.50	15.50	15.50	16.00
Malleable, Valley	14.50	14.50	14.50	15.50
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	†68.00	68.00	68.00	75.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Contract price; spot quotations.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	34.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	27.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	27.00
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.50

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	*1.50*	1.60	1.60	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.598	1.598	1.648	1.898
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	1.70	1.70	1.70	2.00
Hot-rolled strips, Pittsburgh	1.45	1.45	1.45	1.40
Cold-rolled strips, Pittsburgh	1.80	1.80	1.80	2.00

Finished Steel

Per Lb. to Large Buyers:	Apr. 18, 1933 Cents	Apr. 11, 1933 Cents	Mar. 21, 1933 Cents	Apr. 19, 1932 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.00	2.00	2.00	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.10	2.10	2.10	2.30
Sheets, galv., No. 24, P'gh	2.60	2.60	2.60	2.85
Sheets, galv., No. 24, Chicago dist. mill	2.70	2.70	2.70	2.95
Hot-rolled sheets, No. 10, P'gh	1.40	1.40	1.40	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.50	1.50	1.50	1.65
Wire nails, Pittsburgh	1.85	1.85	1.85	1.95
Wire nails, Chicago dist mill	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., P'gh	2.35	2.35	2.35	2.60
Barbed wire, galv., Chicago dist. mill	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	**$10.25**	$10.00	$9.00	$10.00
Heavy melting steel, Phila.	**7.00**	6.75	6.75	7.25
Heavy melting steel, Ch'go	**5.75**	5.25	5.25	6.87½
Carwheels, Chicago	8.00	8.00	8.00	7.00
Carwheels, Philadelphia	8.50	8.50	8.00	9.50
No. 1 cast, Pittsburgh	**9.25**	9.00	9.00	9.50
No. 1 cast, Philadelphia	8.00	8.00	8.00	9.00
No. 1 cast, Ch'go (net ton)	6.75	6.75	6.25	7.00
No. 1 RR. wrot., Phila	7.50	7.50	7.50	8.50
No. 1 RR. wrot., Ch'go (net)	4.50	4.50	4.50	5.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$1.75	$1.75	$1.75	$2.25
Foundry coke, prompt	2.50	2.50	2.50	3.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	5.12½	5.12½	5.00	5.50
Lake copper, New York	5.37½	5.50	5.25	6.00
Tin (Straits), New York	**26.12½**	25.50	23.90	19.00
Zinc, East St. Louis	**3.15**	3.10	3.15	2.75
Zinc, New York	**3.52**	3.47	3.52	3.12
Lead, St. Louis	3.12½	3.12½	3.12½	2.90
Lead, New York	3.25	3.25	3.25	3.00
Antimony (Asiatic), N. Y.	*5.60*	5.95	5.95	5.87½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
April 18, 1933	1.867c. a Lb.	$13.68 a Gross Ton	$7.67 a Gross Ton
One week ago	1.879c.	13.68	7.33
One month ago	1.923c.	13.56	7.00
One year ago	1.970c.	14.35	8.04
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1933	1.948c., Jan. 3	1.867c., Apr. 18	$13.68, April 4	$13.56, Jan. 3	$7.67, Apr. 18	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Production Rises at Pittsburgh, Wheeling and in the Valleys

Steel Business Shows Further Marked Improvement—Melting Scrap Advances—Plates Weaken

PITTSBURGH, April 18.—Marked improvement in orders for nearly all lines of finished steel products continues in this district. Some of this business seems to represent delayed March demand, and seasonal factors are undoubtedly an important influence. However, sentiment is greatly improved among both buyers and sellers, and stronger prices on raw materials are a favorable factor.

Improvement in automotive tonnage is probably the most marked. Structural lettings continue light because of the hold-up in Government projects, but small lots of reinforcing bars and shapes for repair purposes and minor building activity are moving fairly well. Railroad buying is not sufficiently broad to indicate a definite trend. The Erie is inquiring for accessories to match its recent rail order, and the New York Central is in the market for 9000 tons of rails.

Steel ingot production in the district has risen to 18 per cent of capacity, with most of the gain attributable to the larger companies. Resumption of the local rail mill later in the week will boost production a little more. Valley and nearby northern Ohio plants are engaged at about 23 per cent, a sharp increase over the preceding week. Production in the Wheeling district has risen to 40 per cent.

Finishing mill schedules are also higher in most instances. Tin plate production now averages 50 per cent of capacity, and sheet output this week will range between 25 and 30 per cent. Strip and bar mill schedules are also definitely higher.

The price situation is not so clearly defined. Producers of galvanized sheets have advanced the market $2 a ton to 2.70c., Pittsburgh, effective April 17, but more pronounced weakness has developed in plates and cooperage stock. Prices on other flat-rolled products seem to be holding, and semi-finished steel quotations are unchanged, despite pressure on the part of buyers. Pig iron quotations are strong, although orders have not increased materially in this district. Scrap prices are still advancing.

Pig Iron

Sellers in this district report an increase in demand for small lots of iron, although the larger consumers are less active. Shipments have shown considerable improvement over those of March, and prices are distinctly stronger at the levels announced last week. Foundry iron and malleable iron are quotable at $15, Pittsburgh furnace, Bessemer at $15.50, and basic at $14. Valley furnace prices are 50c. less.

Semi-Finished Steel

Although recent sales of billets, slabs and sheet bars are lacking, buyers who are sounding out the market are not able to develop quotations of less than $26, Pittsburgh or Youngstown. A reported sale of sheet bars at $24 to a northern Ohio consumer cannot be confirmed in this district. Forging billets are somewhat more active at $31, Pittsburgh. Wire rods are quiet, with the price unchanged at $35, Pittsburgh or Cleveland.

Rails and Track Accessories

The New York Central has completed plans for the purchase of 9000 tons of rails. No formal inquiry has appeared. The Erie is inquiring for tie plates required for its recent rail purchase, but no specific tonnage is mentioned. It is believed that about 4000 tons of accessories will be required. The Missouri Pacific is in the market for 7000 tons of tie plates. No other specific business has come out in the last week, but miscellaneous releases of track supplies are slightly heavier, and the local rail mill will resume production late this week on a part of its share of the recent Erie rail purchase.

Bolts, Nuts and Rivets

Demand from the automotive industry has improved, but the railroads and the building trade are still limiting their purchases. Nevertheless, miscellaneous specifications for bolts and nuts are somewhat heavier, and the price situation is reported to be satisfactory.

Bars, Plates and Shapes

The structural steel and reinforcing bar markets are adversely affected by the hold-up in Federal projects, although miscellaneous small orders and inquiries are much heavier. Many large Government projects now being talked of would require heavy tonnages of structural steel, but it would require several months for such business to take shape. Merchant bars and plates going to the manufacturing trade are in much better demand, and shipments of alloy steel bars have practically doubled in the last two weeks. Bar mill capacity in the district is engaged at the best rate this year. River craft inquiry is holding up fairly well, but orders are slow to be closed. The United States Engineer at Memphis is inquiring for two large dredges, which will take about 1500 tons of plates and shapes. Quotations on plates have been weakened in this district by competition with Eastern producers. The market is now quotable at 1.50c. to 1.60c., Pittsburgh. Bars and shapes are much better maintained with the recent 1.60c., Pittsburgh, price applying on current small orders which constitute the bulk of the going tonnage.

Cold-Finished Steel Bars

Specifications are considerably heavier, particularly because of improved automotive demand. Jobbers are more disposed to replenish their stocks, and rush orders are very frequent. The base price of 1.70c., Pittsburgh, is well maintained.

Tubular Goods

The Pure Oil Co. has divided 4000 tons of 6-in. line pipe to be used for a gasoline carrying line from Toledo to Detroit between the National Tube Co., Pittsburgh, and the Youngstown Sheet & Tube Co., Youngstown. The line will be built by Ford, Bacon & Davis, Inc., New York. No other line pipe inquiry is reported, and pipe demand as a whole has failed to show much improvement. Oil country goods are dormant, because of uncertainty about the future operations of the Mid-continent fields. However, the flow of oil in some of the larger districts is lessening, and application of pumps in the next few months should develop considerable business in pipe and fittings. Mechanical tubing is slightly more active. Prices seem to be holding, following sharp decreases on both iron and steel pipe since the first of the month.

Wire Products

Both merchant and manufacturers' wire are more active. Jobbers seem to be less reluctant to replenish their stocks, although orders for immediate delivery are still the general rule. Spoke wire is moving to automotive wheel makers at a much heavier rate, and spring wire is in better demand. Quoted prices are being generally adhered to.

Sheets

Sheet specifications continue to improve, with increased releases reported from practically all classes of buyers. The automotive industry is contributing heavily to tonnage gains, and considerable business is coming from makers of electrical refrigerators. There is also a better demand for electrical sheets, and makers of office furniture and equipment are specifying somewhat more freely. Production last week rose steadily, reaching better than 25 per cent before the end of the period. A rate between 25 and 30 per cent is scheduled for the current week. Makers of galvanized sheets have followed the $2 a ton advance announced by the Chicago district producer, effective April 17. The asking price at 2.70c., Pittsburgh, is now only $3 a

ton under the level which prevailed at the beginning of the year. A great many jobbers and other consumers are covered for this quarter at the old price of 2.60c., but the 2.70c. price is being quoted on all new inquiry. No other changes in sheet prices are reported, and the market seems to be well held, particularly on light cold-rolled sheets going to the automotive industry.

Tin Plate

Specifications improved considerably last week, which brought to a close a period for which June requirements are normally called for. As a result, operations have again risen and now stand at about 50 per cent of capacity.

Strip Steel

Orders are considerably heavier, and mills which operated last week were able to extend their activity much longer than had been anticipated. Specifications are largely for immediate delivery, and mills which are not in production are often forced to pass up tonnage. Hot-rolled strip production is now averaging about 25 per cent of capacity, while cold-rolled mills are engaged at a slightly lower rate. The market on cold-rolled material continues weak, although hot-rolled strip is well maintained in this district at 1.45c., Pittsburgh. Cooperage stock, which ordinarily commands a $2 premium over hot-rolled strip, is being shaded $1 a ton in many instances, and a 1.50c. Pittsburgh, price is not uncommon.

Coal and Coke

Domestic coke reflects normal falling off in seasonal demand, and the foundry grade shows little improvement. A few foundries which had been inactive are resuming production, but the movement is scarcely general in this district. The furnace grade is very quiet. The Lake cargo coal movement will soon get under way, and shippers expect a fair demand for lump grades this season.

Scrap

The market has developed further strength in the last week, as the better grades have become scarcer. Consumers seem more disposed to make purchases, although dealers are reluctant to contract for significant tonnages. Heavy melting steel has been sold at $10 and $10.25, with dealers offering the lower figure to cover against old contracts at certain points. Substantial tonnages of rails have been sold to at least three users at $10, and sales of No. 2 steel at $8.75 and $9 are reported. A consumer of hydraulic bundles has released shipments against an old order at around $11, and dealers are having difficulty bringing compressed sheets into this territory from Michigan even at that figure. Substantial sales of No. 1 steel and hydraulic bundles in the valleys at $10 and $9.50 respectively have tended to strengthen prices in this district, so far as automobile scrap is concerned.

British and Continental Markets Continue to Show Improvement

LONDON, ENGLAND, April 18 (*By Cable*).—British markets are under holiday influences, but confidence is increasing and there are indications of broadening interest overseas.

United Kingdom exports of pig iron in March were 9000 tons, none of which was sent to the United States. Total exports of all kinds of iron and steel amounted to 155,000 tons.

Continental steel is less active owing to the Easter holidays, but prices are fairly firm, with many large works practically out of the market. Considerable optimism is expressed regarding the likelihood of early establishment of international sales offices despite the admitted complexity of questions at issue. The next meeting to discuss this subject will be held on April 22. French producers hope that offices will be functioning by June 1.

The International Tube Cartel has now been definitely renewed until March 31, 1935.

The Polish Government has approved a barter agreement whereby Poland will supply Czechoslovakia with coal over a long period against machinery from the Skoda Works valued at 120,000,000 Czech kronen.

Polish steel works are negotiating with Russia for new steel contracts of substantial size.

British Prices f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets open-hearth	£5	to	£5 7s. 6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	15s. 6d.	to	15s. 9d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hrth.	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£8 10s.		
Galvanized sheets, No. 24 gage	£10 10s.	to	£10 15s.

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

Billets, Thomas	£2 4s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s.		
Steel bars, merchant	£2 15s.		
Beams, Thomas	£2 8s.		
Angles, Thomas 4-in. and larger	£2 9s.		
Angles, small	£2 12s.		
Hoops and strip steel over 6-in. base	£3 10s.	to	£3 12s. 6d.
Wire, plain, No. 8	£5 7s. 6d.		
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

Machine Tool Orders at New Low Point in March

March brought a new low record in machine tool sales, according to the monthly compilation of the National Machine Tool Builders' Association, whose index figure for orders last month is 13.4 against 15.2 in February and 31.6 in January. The poorest month in 1932 was July, with a sales index figure of 25.3.

The decline in machine tool business in February and March has brought the three-months' moving average of the association down also to a new low, at 20.1 against 27.5 at the end of February and 33.1 at the end of January. Thus, the first quarter of this year probably was the worst period that the machine tool industry of the United States has ever experienced.

Shipments of machine tools also fell off in March, being represented by the figure 21.8 against 26.7 for February and 26 for January. Unfilled orders at the end of March are represented by the figure 27.7 against 35.3 for February and 48.6 for January.

Gives Cost Figuring Data for Welding and Cutting

Methods for determining the consumption and costs of material for oxyacetylene blowpipe welding, cutting and heating operations are summarized in a booklet on "How to Figure Oxwelding and Cutting Costs," published by the Linde Air Products Co., 30 East Forty-second Street, New York. Conditions under which each of the three methods described should be used are presented in tabular form for ready reference. Examples of typical jobs include large castings, welded piping and automotive repair work. Estimating the cost of blowpipe operation for small jobs of welding, heating or cutting is greatly simplified by the system of unit costs described, and comparison with other means of doing the same job can be quickly made.

Extension of the Federal barge line service to Chicago has been approved by Secretary of War George H. Dern. The present limit of barge operations is Peoria. According to present plans, service will begin about July 1.

Chicago Steel Production Has a Further Sharp Gain

Rate Now 22 to 24 Per Cent Against 19 Last Week—Automobile Industry Principal Support of Market

CHICAGO, April 18.—A steel mill blast furnace, which has been banked for many months, has been brought into service, making a total active count of six out of 36. Ingot output has also gained a few points to a range from 22 to 24 per cent of capacity. The burden of supporting the iron and steel market still rests upon automobile manufacturers, but miscellaneous users are crowding in a little faster.

Demand, on the whole, is still of the character which calls for numerous small and mixed lots for immediate consumption. This situation, though awkward for mills, is being met and few deliveries are being delayed. Throughout the period of extreme idleness mill equipment has been kept in first class condition and not only is this a help in meeting the present unusual demand, but producers are fully prepared to cope with further expansion in consumption.

Strength of prices is a notable feature of the market. A producer of galvanized sheets is announcing an advance of $2 a ton, and heavy melting steel, as well as other grades of scrap, have sold up during the week. Announcement comes from Birmingham of higher prices for Southern iron, the quotation now being $11 for delivery to the Chicago territory. The brewing industry, though steadily in the market for steel, is cautiously gaging trends, and on this score a number of new brewery projects are being held in check.

Pig Iron

Southern iron has been marked up to $11 a ton, Birmingham, for delivery to the Chicago territory. However, very little of this commodity is moving in this direction. Shipments of Northern foundry iron continue to grow, and the April movement is assured of being by far the best of the year. Fresh inquiry and new sales are assuring that even better shipments are in the offing. Low phosphorus iron is moving more rapidly from local docks, where it has been carried over from last year. Charcoal iron stocks are dwindling slowly. No charcoal furnaces being lighted.

Rails and Track Supplies

Outstanding in importance are orders for 4000 tons of tie plates by the Soo Line. Miscellaneous track accessory orders remain in fair volume, and there is still overhanging the market the tie plate inquiry of the Missouri-Pacific. Rail inquiries are absent, but both of the local mills are engaged on small schedules. Light rail business is confined to an occasional carlot.

Wire Products

Demand continues its slow growth as it spreads in more directions. Hardware jobbers are buying more freely and improved demand for fencing and steel posts, noted a week or 10 days ago, is still in evidence. Automobile manufacturers and part makers are releasing larger quantities of wire and wire products, and it is their volume that is giving the greatest support to the market. Use of copper wire remains slow and wire rope is in light demand. Producers are still rather cautious and have not advanced operations in recent weeks, preferring to reduce mill stocks.

Structural Material

Contrary to the trend in other steel markets, the structural market is sliding to lower levels. Private work is almost out of the picture, and building activity dependent on action at Washington is the lowest in many months. Architects are hopeful that business will improve, but at present there are very few projects on their boards. Bids are again being taken on a hospital at Duluth, Minn., and plans are being prepared for a bottling works at Minneapolis. The Rock Island now has plans out for converting a fixed span to a movable span at Seneca, Ill. Word has reached Chicago that the Government will not hold up construction of the St. Louis Federal Building.

Bars

Both sales and specifications for bar mill products are showing additional gains. Releases are coming in from a greater number of automobile manufacturers, especially in the lower price field, and there is a substantial widening of use by miscellaneous industries. Many orders are small and for mixed lots; the mills, though doing many things that are far from standard practice, are meeting the situation with little delay in deliveries. Practically all orders for bars are for immediate use.

Sheets

Once again an effort is being made to advance prices for galvanized sheets. A local mill is sending out notices that, effective at once, this product will be priced at 2.80c. a lb. Chicago mill, or 2.85c., delivered Chicago, this being an advance of $2 a ton. Shipments of sheets remain steady, with the bulk of the movement going to automobile manufacturers and brewery accessory plants. Roofing manufacturers are doing little business with mills, but they report better movement from their own plants.

Plates

A Milwaukee brewer has ordered 400 tons of tank material, and another brewer at Lafayette, Ind., has placed 220 tons. These tonnages, with other small lots of plates for the same industry, make up the bulk of transactions in this market. Most of the steel moving to railroad shops is in small mixed lots.

Reinforcing Bars

Shipments against road slab and bridge contracts hold the major part of the interest in this market. Few estimates are being made and inquiries are near the low point of the year. The State of Indiana opened bids April 18 on 1000 tons of road and bridge work. New road work in Illinois is slow in coming out for figures. However, some tonnage should soon be available, as the new sales tax for unemployment relief purposes is operating, and gas tax funds should therefore be released for new construction work.

Cast Iron Pipe

Both sales and inquiries are very light and are confined to business of carlot proportions. The outlook is obscure and depends, according to local sellers, on the extent to which municipalities can obtain Government aid. St. Louis has taken bids on a large tonnage of 6 to 20-in. pipe. Buffalo, Ohio, will buy 35,000 ft. of 2 to 8-in. pipe through a Cincinnati contractor. Construction work is under way on the Wilmette, Ill., water plant, where 800 tons of pipe are required.

Scrap

A steel mill has made a small purchase of heavy melting A steel at $6 a gross ton, delivered, which is an advance of 50c. over the last previous sale. This grade is strong at the new price and a further advance is likely, especially in view of the possibility of boat movement away from Chicago and the fact that the supply for immediate delivery is not large. Dealers anticipate a $7 price at Chicago because this figure, they believe, can be obtained at Chicago docks from Lake Erie users. Dealers argue that local mills will meet this price or go a shade above in order to stop the flow from the local market. Low phosphorus grades and railroad malleable have also advanced on recent sales.

West Leechburg Steel Co., Pittsburgh, is removing its general offices from the Farmers Bank Building in that city to the Union National Bank Building, Fourth Avenue and Wood Street. The change is effective April 24.

Eastern Pennsylvania Trade Has Had No Marked Gain

Some Pick-Up in Sheet Buying But Heavier Lines Are Dull—Heavy Melting Scrap up 50c.

PHILADELPHIA, April 18.—Conditions in the iron and steel market reflect no important change in the past week, and operations remain at about 12 per cent of ingot capacity.

The heavy lines have seen a slight recession in demand. Railroad buying of plates, shapes and bars is almost entirely absent. No substantial pick-up is looked for in the way of carrier business until the railroad consolidation plan is worked out. Even if it is only partially acted upon at Washington, as seems to be the present plan, it is believed it will develop some business for rail and track accessory requirements and perhaps some car repair work. There has developed a little more interest on the part of some of the larger consumers, such as gas works and other public utility plants, which are figuring on rehabilitation needs.

Sheet makers have seen a mild pick-up in releases both for full-finished and commercial grades. Prices are said generally to be well maintained.

The tone of the scrap market is firmer, with an actual advance of 50c. per ton for No. 1 heavy melting steel.

Pig Iron

Demand shows virtually no change. It is chiefly for foundry grades and, except for one or two inquiries of more than 500 tons, calls for carlots. Blast furnace interests report that the higher prices are holding well and that melters not only have done a limited amount of forward buying but are showing less resistance to quotations.

Plates, Shapes and Bars

The market is sluggish and has seen a decline in demand. Makers are anxiously awaiting definite action on the railroad consolidation plan, though they do not expect to see a complete program adopted at the special session of Congress. Rather it is believed it will for the present be confined largely to the setting up of a coordinator. Nevertheless this plan in itself probably would bring about some buying of rails and track accessories, together with purchases for repair work. An extensive scrapping program calling for much new equipment is not expected to be definitely determined upon in the near future. The price structure is unchanged. It is reported that the Navy Department will ask for bids soon on four destroyers, requiring about 3100 tons of steel, including 2000 tons of plates, 900 tons of structural material and 200 tons of merchant bars. The Gilmour Steel Products Co., Philadelphia, has been awarded about 125 tons of reinforcing bars for a two-story addition to the Federal Reserve Bank here. The Kalman Steel Corpn., Philadelphia, will supply about 125 tons of reinforcing bars for the sedimentation basin for the waterworks system at Pottstown, Pa.

Sheets

Releases of sheet tonnages have shown a moderate increase and cover both full-finished lines for automobile production and commercial grades for general consumers. One maker is operating one of its plants at 40 per cent of capacity and another plant is at 30 per cent capacity. Jobbers are also taking somewhat larger requirements for stock. An Eastern maker of motor trucks and buses has received an order for from 50 to 75 all-steel buses.

Imports

The following iron and steel imports were received here last week: 5677 tons of pig iron from the Netherlands and 1201 tons of the same product from British India; 76 tons of steel bars, 59 tons of steel tubes, 43 tons of steel rods, 25 tons of silico-manganese and 9 tons of steel billets from Sweden; 6 tons of galvanized steel strips from England.

Scrap

Small transactions have raised the price of No. 1 heavy melting steel 50c. to $7 a ton. While mills purchases are light, the tone of the scrap market continues to be firmer and dealers say that any consequential buying movement would bring higher prices. Yard dealers are holding for increased prices and some dealers to cover on contracts have paid higher levels. Indicative of this trend is the price of $5.75, Coatesville, paid by one dealer to cover on a contract for No. 2 steel. This grade, however, continues to be quoted at $5 to $5.50, delivered. A cargo of 4000 tons of No. 1 heavy melting steel is being loaded here for shipment to Japan. Export business has been a factor in giving strength to the market.

Birmingham Pig Iron Prices Advanced $1

BIRMINGHAM, April 18.—The first advance in Birmingham pig iron prices in more than two years occurred Saturday, when local furnaces raised the price of No. 2 foundry to $12, f.o.b. furnace. Previously, for a long period, the price had been $10 for the Northern market and $11 for the Southern market. In anticipation of this advance, consumers during the past 10 days have been gradually covering their second quarter requirements, and for the first time in nearly three years the furnaces have a comfortable amount of forward tonnage on their books. There is no immediate effect from the price advance as to shipments. Current deliveries are still sluggish, and the aggregate for April, to date, by the three merchant producers in the district, closely follows the March rate. The sentiment in the pig iron market is the best in a long while and the outlook is more hopeful. During the past two months only one furnace has been producing foundry iron in this district. Two companies have been shipping from stocks, one since Dec. 31 and one since the middle of February. The Republic Steel Corpn. and the Sloss-Sheffield Steel & Iron Co. each have one furnace banked. The former will probably resume production around May 1 and the latter around June 1. Pressure pipe plants, the largest consumers of iron in this district, are still faced with uncertain prospects, as the municipal financing situation is still tangled. Plant operations range from one to three days a week, on limited schedules. Last week four Birmingham pipe manufacturers were low bidders on about 3000 tons at St. Louis, and they hope to secure immediate releases on this tonnage. There has been no recent change in furnace operations, two being in blast, one on basic iron and one on foundry.

Steel

Although not quite as large as for the two preceding weeks, the new tonnage booked last week by the two steel manufacturers in this district continued to follow the stronger trend of the past month. This improvement is now being maintained largely by the demand for lighter products. Plates and structural shapes are not active.

The Ensley rail mill of the Tennessee Coal, Iron & Railroad Co. was started Monday for one week's operation. About 3000 tons will be rolled.

For three successive weeks, including the present one, seven open-hearth units have been in operation. This is the best schedule since January.

Wyckoff Drawn Steel Co., effective April 24, is removing its general offices from the Frick Building, Pittsburgh, to the Ambridge, Pa., plant of the company, mailing address, Post-office box 594, Ambridge, Pa.

Cleveland Steel Orders Gain; Ingot Output Higher

Many Plants in Metal-Working Field Report an Increase in Business—Demand Becoming More Diversified

CLEVELAND, April 18.—Demand for finished steel made further gains the past week. Considerable tonnage in sheets, strip steel and bars came from the motor car industry and there was an increase in volume and a more diversified demand from other consuming industries. Many plants in the metal-working field report a gain in business and in inquiry and have made some increases in their operations. While these are buying steel in small lots, the average size of order has increased somewhat.

Ingot output in Cleveland was increased three points this week to 35 per cent capacity by the putting on of another open-hearth furnace by the Corrigan, McKinney Steel Co.

Reports of an encouraging nature are coming from the motor car industry, which has speeded up production to fill up the gap caused by the decline in output in March because of the bank holiday. Dealers' stocks of cars have been reduced and must be replenished. Steel orders for the most part are coming from the Chevrolet, Ford and Chrysler companies. Automobile manufacturers are buying from hand-to-mouth, with future schedules apparently somewhat indefinite, and are insisting on prompt deliveries. Mills in most cases so far have been able to meet delivery requirements.

Building activity is almost at a standstill awaiting developments in the programs for National and State construction work. A survey of brewery plants in Ohio indicates that considerable steel will be required in the next few months in reconstructing buildings and installing tanks and other equipment. So far these brewing companies have not done anything in the way of rehabilitating their plants.

The Erie Railroad has purchased frogs and switches to be used with the 24,549 tons of rails it recently purchased and has an inquiry out for tie plates and rail anchors for about one-half of the total tonnage of rails. Track bolts will be purchased from month to month as needed.

Prices are being well maintained on practically all steel products. Scrap has advanced 50c. a ton in Cleveland, and pig iron market shows a firmer tone.

Pig Iron

The improvement in shipments over March is being maintained. However, sales and inquiry were light during the week. Lake furnaces, which recently advanced their prices on foundry and malleable iron 50c. a ton to $14, are now quoting $14.50 for delivery in immediate territories where competition does not prevail. For Cleveland delivery the price is unchanged at $15. The restoration of the 12c. per ton emergency freight surcharge on intra-state shipments which the railroads asked to be placed in effect May 1 has been deferred until Aug. 28 by the Ohio Public Utilities Commission, which will conduct a hearing on the application April 24. As the same surcharge is in effect on inter-state shipments, it will be necessary for furnaces outside of the State to absorb this 12c. charge to meet competition in Ohio.

Iron Ore

Ore stocks at furnaces and Lake Erie docks April 1 were nearly 5,000,000 tons less than on the same date a year ago. The amount at furnaces April 1 was 24,486,207 tons and the amount at furnaces and Lake Erie docks was 29,556,975 tons as against 34,491,289 tons on the same date last year. There were 593,024 tons consumed in March, a decrease of 41,419 tons for the month. Lake furnaces used 245,069 tons last month, a decrease of 39,716 tons. Central district furnaces consumed 346,126 tons, a gain of 1157 tons. Eastern furnaces used 651 tons, a decrease of 1072 tons, and all-rail furnaces melted 1178 tons, a decrease of 1788 tons. There were 35 furnaces in blast using Lake ore April 1, a decrease of five for the month.

Sheets

A good volume of orders came from the motor car industry during the week. Automobile makers are buying only for early needs and the orders were for quick shipment. The refrigerator industry continues to supply orders for a fair tonnage. There is some demand from makers of beer cases. Miscellaneous demand shows a little improvement. Prices are being well maintained.

Bolts and Nuts

Demand from the motor car industry has further improved, some good orders coming from that source during the week. Demand from railroads and jobbers continues slack.

Strip Steel

Considerable new demand from the automotive industry for both hot and cold-rolled strip developed during the week. These orders were for early needs and buyers are crowding the mills for deliveries. Some new orders were placed for galvanized strip for making beer cases and for hoop for beer kegs. Prices are steady at 1.45c., Pittsburgh, for hot-rolled strip and 1.80c. to 2c., Cleveland, for cold-rolled material.

Bars, Plates and Shapes

Demand for steel bars has further broadened and is fairly well diversified, although the larger part of the business is coming from the automotive industry. Orders for plates in car lots have also increased. Oil refining plants are buying more freely. Inquiries are numerous from the brewing industry, but tonnage is slow in coming from that source. Structural material is quiet.

Bars are firm at 1.65c., Cleveland. Fabricators are able to buy round lots of structural material and plates at 1.50c., Pittsburgh.

Scrap

The market is firmer, with an advance of 50c. a ton on both steel making and blast furnace grades. A Youngstown district mill late in the week purchased a substantial tonnage of heavy melting steel at $10 for No. 1 and $9 for No. 2. Local dealers are paying $7.50 for No. 1 heavy melting steel and $5.25 for blast furnace scrap for delivery to a local mill, or the same prices at which this consumer recently contracted for April. The local supply of scrap is scarce.

St. Louis Pig Iron Market Firmer; Scrap Advances

ST. LOUIS, April 18.—The market for pig iron, both Northern and Southern make, is firmer than a week ago, with some increase in business, but with many melters still holding off making purchases to determine in their own minds whether prices will maintain strength. An advance of $1 a ton on Southern grades has been announced. Jobbing foundries in the district report a heavier melt. Operations of steel mills is the same as for several weeks past.

The pipe market has firmed up somewhat since the recent price reductions, but business continues light because of indecision as to regulations concerning production in Oklahoma and Texas, a situation which also has affected adversely other lines of iron and steel. Railroads have contracted for their requirements for plates, shapes and bars for second quarter; first quarter specifications were quite small. Structural fabricating plants in the district are operating at an average of about 15 per cent of capacity; one large plant is at 60 per cent and another at 30 per cent of capacity.

Dealers are said to be eager to buy scrap to cover short orders, and are paying more for yard scrap. There is a good demand for malleable from Illinois and Indiana mills. Steel angle bars, steel rails less than 3 ft. and railroad malleable are 50c. a ton higher.

New York Steel Trade Lagging Behind Rest of the Country

Some Improvement Experienced—Tin Plate Specifications Hold Up Well—Galvanized Sheets Advanced $2

NEW YORK, April 18.—A further slight improvement has developed in Eastern steel trade, although it is a matter of comment that business here has shown less expansion during the past few weeks than it has in some other sections of the country. Jobbing business in this territory, and particularly in New England, has shown a rather sharp pick-up, which should be reflected soon in larger mill orders from the warehouses. Tin plate specifications have held up well.

Sales offices in New York have received notice of an advance to 2.70c. a lb., Pittsburgh, on galvanized sheets, to take effect at once. Nearly all regular users of galvanized sheets have covered for the quarter at 2.60c., and the specifications they recently issued against first quarter contracts presumably will take care of their requirements for the next few weeks. Thus, the new galvanized sheet price may not get an immediate test.

Directors of the New York Central Railroad have authorized the purchase of 9000 tons of rails, which is presumed to be this road's entire schedule for this year. No inquiries have been issued, and it is understood that the rails will be ordered from time to time in small amounts as required.

Pig Iron

The A. P. Smith Mfg. Co., East Orange, N. J., is inquiring for 200 tons each of No. 2 plain and No. 2X foundry iron for shipment from June 1 to Sept. 30. Other inquiries cover scattered spot lots. Low phosphorus iron has experienced a pick-up in carload demand. Total bookings of pig iron reported for the past week approximated 2500 tons, matching the volume in each of the two preceding weeks. A few transactions involved delivery through December, but most contracts are being restricted to second and third quarter delivery. Shipments are under the retarding influence of unimproved foundry operations. Orders for special castings are more frequent, but miscellaneous demand continues to be exceptionally light. Prices, while lacking the test of important buying, reflect firmness. Alabama iron for delivery to this district has been advanced $1 a ton to a base of $11, furnace. Silicon differentials of 25c. a ton have been established on Buffalo brands for New England delivery. Premiums have not yet been made applicable, however, to other Eastern consuming districts. Quotations on foreign iron are unchanged. Eastern Pennsylvania iron is quiet at $13.50, base, furnace.

Reinforcing Bars

Fresh specifications were meager during the past week. Lettings were also light, with no important contracts reported. Opening of bids on a sewer project in Brooklyn, involving 366 tons, revealed P. Tomasetti Contracting Corpn., Brooklyn, as low bidder. The Pittsburgh base of 1.40c., a lb. is being fairly well maintained on minor quantities. On sizable lots, however, sharp concessions continue to rule.

Scrap

In the absence of any improvement in domestic demand, brokers have yielded to the urgent calls of foreign buyers for additional tonnages of heavy melting steel. Recent export bookings, however, have been consummated at unchanged prices. Although the recent advances in steel scrap prices at Pittsburgh have engaged the attention of brokers here, the advances have not been sufficient to draw out offerings of Eastern supplies. Sellers, as a result, have lacked a basis upon which to hold out in their demand for higher export prices. Cast grades, though in poor demand, are nominally firm, while specialties are rather neglected at unchanged levels.

Boston Pig Iron Market Slightly More Active

BOSTON, April 18.—The pig iron market is a little more active, sales the past week having exceeded 1000 tons, including 500 tons of eastern Pennsylvania No. IX to the Westinghouse Electric & Mfg. Co., Springfield, Mass., 200 tons No. 2X to another Springfield foundry, 100 tons No. 2X to the Amoskeag Mfg. Co., and smaller lots. Krompton & Knowles Loom Works, Worcester, Mass., intimates it will cover on its 500-ton inquiry this week. The A. P. Smith Mfg. Co., Orange, N. J., is inquiring here for 400 tons, and the Navy Department, Washington, for 200 tons. New England jobbing foundries in general are rather flat, but the industrial foundry situation is better than it has been in many months. Electric refrigerator manufacturers report a sizable increase in business.

Because of the Jewish holidays, the scrap market is virtually at a standstill. A Fall River, Mass., concern has been shipping quite a little textile machinery cast to a New Jersey consumer, and tonnages of chemical borings also have been moved to that State. Higher prices for scrap at Pittsburgh have raised hopes of better business here, but general opinion is that there is comparatively little desirable scrap in New England.

Southern Pig Iron Price Advanced at Cincinnati

CINCINNATI, April 18.—Southern pig iron makers have announced an advance in prices, amounting to $1 a ton at Birmingham for shipments to Southern points, but amounting to $2 a ton for shipment to some Ohio River points. For some time the Southern interests have quoted $11 a ton, Birmingham, for Southern shipments and $10 a ton for Northern shipments, but under the new plan there will be no specific price for Northern shipment, the f.o.b. Birmingham price to depend upon the competition that has to be met in the North. Thus, the Cincinnati price will be based on $12 a ton, Birmingham, for the base grade. The new Cincinnati price will be $15.82 for the base grade, with silicon differentials of 25c. Now business the past week totaled about 700 tons, all in small lots, of which Southern furnaces booked about 150 tons. Consumer interest is still limited to actual needs of the immediate future.

Steel

Expansion in automobile manufacturing schedules is reflected in improvement in automobile sheet specifications, but consumers in other lines did not order so freely as in the week previous. Production in this district is at nearly 50 per cent of capacity, though backlogs are small.

Scrap

Reports of better prices paid on recent railroad lists have added strength to scrap prices here, but new business is small and infrequent.

Detroit Scrap Market Shows Further Strength

DETROIT, April 18.—Anticipating a further gain in steel mill buying and the possibility of currency inflation, local scrap dealers are paying 25c. to 50c. a ton more than they did a week ago for most items, including heavy melting steel and hydraulic bundles. The district steel plant and several automotive foundries are taking more scrap as a result of recent sharp increases in production. Prices are still too low to induce small scrap dealers and producers at distant points, which have high freight rates to consuming markets, to sell their holdings. The Chrysler Corpn., which has been storing its scrap for several months instead of disposing of it at prevailing prices, is said to have on hand about 20,000 tons.

Fabricated Structural Steel

Awards and New Projects in Small Volume

WITH the exception of 1400 tons for a post office in Nashville, Tenn., lettings are in small lots and total only 4200 tons, the second lowest tonnage for any week this year. New projects of 3150 tons are also light, comparing with 17,200 tons in the week previous and 1450 tons two weeks ago. Awards follow:

NORTH ATLANTIC STATES

New York, 225 tons, grillages for New York Central viaduct foundations, Little West Twelfth to Eighteenth Street, to American Car & Foundry Co.

Brooklyn, 270 tons, laundry building, to an unnamed fabricator.

Jersey City, N. J., 240 tons, post office, to Selbach-Meyer Co., West New York, N. J.

Trenton, N. J., 200 tons, M. S. Gane building, to A. K. Bugbee Co.

THE SOUTH

Nashville, Tenn., 1400 tons, post office, to Nashville Bridge Co.

Corpus Christi, Tex., 1600 tons, steel piling for dam, to Inland Steel Co.

CENTRAL STATES

Cleveland, 250 tons, substation for Cleveland Electric Illuminating Co., to American Bridge Co.

Detroit, 105 tons, bridge for Pennsylvania Railroad, to American Bridge Co.

Milwaukee, 150 tons, steel piling for lighthouse, to Inland Steel Co.

Jasper County, Iowa, 160 tons, beam bridges, to Pittsburgh-Des Moines Steel Co.

Chicago, 125 tons, work for World's Fair, to Gage Structural Steel Co.

Wichita, Kan., 350 tons, bridge for Santa Fe Railroad, to Kansas City Structural Steel Co.

Pemiscot County, Mo., 150 tons, bridge, to Stupp Brothers Bridge & Iron Co.

State of Missouri, 580 tons, highway bridges at Farley and Stanbury, to Pittsburgh-Des Moines Steel Co.

WESTERN STATES

Kit Carson County, Colo., 134 tons, State highway structure, to an unnamed bidder.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Lowell, Mass., 350 tons, brewery.

Salem, N. Y., 290 tons; grade crossing elimination for Delaware & Hudson Railroad; bids April 25.

Binghamton, N. Y., 700 tons; State armory; to be re-bid in June.

Dannemora, N. Y., 900 tons; Lowman Construction Co., Elmira, N. Y., low bidder.

State of New York, 160 tons, highway bridge at Hurley.

Bloomsburg, Pa., 100 tons, post office.

CENTRAL STATES

Sheboygan, Wis., 100 tons, court house; bids close April 26.

St. Louis, 300 tons, Falstaff Brewery, addition.

Duluth, Minn., 230 tons, hospital; plans revived.

Minneapolis, tonnage not stated, bottling works.

WESTERN STATES

Culbertson, Mont., 900 tons, bridge.

San Francisco, 800 tons, County Jail; Anderson & Ringrose low bidder.

FABRICATED PLATE

AWARDS

Philadelphia, 165 tons, tanks and stack for Naval Hospital, to Quaker City Iron Works.

Lafayette, Ind., 220 tons, tanks and vats, for Lafayette Brewery, Inc., to Chicago Bridge & Iron Works.

Illmo, Mo., 100 tons, overhead tank, to Chicago Bridge & Iron Works.

Denver, 180 tons, eight pier plates for Boulder Dam, to Goslin-Birmingham Mfg. Co.

NEW PROJECTS

Providence, R. I., 600 tons, gasoline tanks at Providence and Rochester and Syracuse, N. Y., for Richfield Oil Corpn.

Memphis, Tenn., 1500 tons, two dredges for United States Engineer.

Conneaut, Ohio, 200 tons, municipal waterworks tank.

Pacific Coast Jobs Call For Iron and Steel Pipe

SAN FRANCISCO, April 17.—Bids are to be taken early in the summer at Seattle, Wash., on the construction of approximately three miles of 20-in. cast iron water main to replace wooden main from West Florida Street to Sixty-third Avenue. The work is estimated to cost $100,000 and will require 1195 tons of pipe. Bids are to be closed on April 27 on the Cedar River pipe line at Seattle, which will be 27,000 ft. of 78-in. pipe. Alternates are being taken on wood, concrete and welded steel. Approximately 4000 tons of plates would be required. Bids are under consideration in the same city on the Railway Avenue seawall, which will require 3561 tons of sheet piling, 1754 tons of reinforcing bars and 770 tons of cast iron pipe.

Although bids have been taken on the county jail at San Francisco, it is likely that the award will be delayed as bids exceeded original estimates. The most noticeable difference was on metal interior equipment, on which six identical bids exceeded estimates by $100,000. The awards on the Federal Building at San Francisco, and on a number of other projects are being held up by the Government.

Bids are to be taken at Los Angeles on April 26 on three 300,000-gal. reservoirs or alternate bids on three steel tanks of the same capacity. A number of contracts have been let by the Metropolitan Water District on the Colorado River aqueduct, which will require steel. The contracts are for the placing only as the district will call for bids on the steel as needed. It is estimated that over 200,000 tons of steel will be used in the entire project.

Buffalo Steel Plant Operations Higher

BUFFALO, April 18.—Without any large inquiries or orders, a better feeling pervades the local pig iron market. There has been a considerable influx of small orders, with melters apparently wanting to make certain they have iron under contract against a possible rising market. A definite improvement has taken place in shipments. Differentials on Buffalo iron for Eastern shipment seem to have been established.

Steel

Definite improvement has occurred in steel plant operation, with the Lackawanna plant of Bethlehem Steel now operating five open-hearths as against three last week. Republic Steel has increased its open-hearth operation from two to three furnaces. Up until last week this plant had for many weeks been operating one open-hearth. Wickwire Spencer is operating one open-hearth. The Seneca sheet division of Bethlehem is operating at 25 to 30 per cent against 20 per cent recently. Bids will be taken today on 230 tons of structural steel for a grade crossing elimination at Unadilla, N. Y., and on April 25 on 290 tons at Salem, N. Y. Both these projects are for the Delaware & Hudson Railroad. Bids will be taken some time in June for the Binghamton armory, 700 tons. This project is being re-bid, following cancellation of contracts due to a change in the site during the winter. An Elmira concern is low bidder on the Dannemora prison job, requiring 900 tons of structural and 460 tons of bars.

Scrap

The Buffalo market is sentimentally stronger, under the influence of a firm Pittsburgh market. Prices at Pittsburgh have reached a point where it is possible to ship material out of Buffalo. Ordinarily there is a spread of about $1 to $2 a ton between the Buffalo and Pittsburgh prices of No. 1 heavy melting steel. There is now a spread of close to $3.50. The firmness of the Pittsburgh market is diverting scrap which might come to Buffalo from central New York points. There is activity in sales of odd lots of short rails at $10, Buffalo, malleable at $8 and some inquiries are appearing for No. 1 machinery cast scrap. More activity is apparent than in many months. Weirton is understood to be paying $8.25 to $8.50 for uncut structural.

Tin, Zinc Move Higher as Copper and Lead Hold Recent Gains

Spot Straits Tin at New York Reaches Highest Level Since September, 1931; Zinc up $1 a Ton

NEW YORK, April 18.—Plans for a complete suspension of domestic copper operations within the near future are rapidly approaching a definite point. Though no details have been made public, leading factors here admit that the present status of the movement promises early crystallization of the important phases of the suspension program. Consumers, in spite of the threat of higher prices in the event of a complete shutdown, are displaying little interest in current offerings. Although refined copper stocks have decreased gradually during the past six months, the present surplus supply still represents generous proportions, and there is obviously no urgent reason, except of a speculative nature, for extensive buying in anticipation of the prospective suspension. Electrolytic copper has consequently drifted along at 5.37½c. a lb., delivered Connecticut, for shipment through July. Lake copper is likewise unchanged at 5.37½c., delivered New York.

Resumption of trading today in foreign copper markets, following the holidays, uncovered a few small sales of electrolytic on the basis of 5.40c., c.i.f. Continental ports. Prior to the holidays, values in the European centers ranged from 5.25c to 5.35c.

Tin

A sharp upswing in sterling today provided impetus for a relative rise in spot Straits tin to 26.12½c. a lb., the highest level that has prevailed in the New York market since Sept. 4, 1931. The mercurial action of sterling, which climbed from $3.46 this morning to $3.50½ early this afternoon, made trading extremely difficult. Dealings in prompt tin were further retarded by the increasingly short position of New York stocks. Interest in future metal is at a minimum because of heavy premiums asked for forward sterling. In the early part of the past seven-day period, tin markets felt the influence of the Easter holidays, the London market having remained closed from Thursday until today. London quotations today reflected higher positions for the week, with spot standard at £157 15s. a ton, future standard at £158 10s., and spot Straits at £164. Similar tendencies characterized the Singapore market, which today was quoted at £165. While the recent rise in prices has been sponsored chiefly by the movement of sterling, values now indicate a strong undertone as a result of reports that no increase in production will be effected upon expiration of the Byrne plan on June 1.

Lead

Trading has slackened somewhat, following the buying spurt of about 10 days ago. However, with about only 50 per cent of April consumer needs covered, a fair amount of activity is in prospect for the remainder of the month. Based on sales of April lead, deliveries during the current month are expected to be the largest in many months. Sellers have been heartened also by definite signs of increased consumption, as indicated by deliveries in March of about 22,000 tons, contrasted with 17,000 tons in February and 19,000 tons in January. March output, however, at about 26,000 tons, was larger than had been expected and effected an increase of approximately 4500 tons in refined stocks. The prospective heavy April deliveries and curtailed operating schedules now in effect are expected to preclude a further increase in stocks as of April 30. The favorable outlook has imparted firmness to prices, which are well maintained at 3.25c. a lb., New York, and 3.12½c., St. Louis.

Zinc

Rising ore prices and a good demand for prime Western zinc stimulated an advance yesterday of $1 a ton to a basis of 3.15c. a lb., East St. Louis, or 3.52c., New York, with a premium of 2½ points for May and June delivery. Ore prices last week ranged from $17 to $21 a ton for flotation and $18 to $20 for mill grades, with sales of 3800 tons for the week, compared with only 980 tons the week before. Ore production last week aggregated 1800 tons, about 300 tons in excess of the preceding week's output.

A protective committee of stockholders of the Cleveland Automatic Machine Co. has been formed consisting of John P. Witt, F. E. Wright and John R. Watson, to protect and conserve the assets of the company. The notice to the stockholders states that preferred stockholders should be represented on the board. Two suits in behalf of the stockholders have been started in the Common Pleas Court in Cleveland.

The Week's Prices. Cents Per Pound for Early Delivery

	April 12	April 13	April 14	April 15	April 17	April 18
Electrolytic copper, N. Y.*.	5.12½	5.12½	5.12½	5.12½	5.12½	5.12½
Lake copper, New York....	5.37½	5.37½	5.37½	5.37½	5.37½	5.37½
Straits tin, Spot, N. Y.....	25.50	25.75	...	...	25.75	26.12½
Zinc, East St. Louis.....	3.10	3.10	3.10	3.10	3.15	3.15
Zinc, New York.....	3.47	3.47	3.47	3.47	3.52	3.52
Lead, St. Louis.....	3.12½	3.12½	3.12½	3.12½	3.12½	3.12½
Lead, New York.....	3.25	3.25	3.25	3.25	3.25	3.25

*Refinery quotations price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.60c. a lb., New York.
Brass ingots, 85-5-5-5, 5.50c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	27.75c. to 28.75c.
Tin, bar	29.75c. to 31.75c.
Copper, Lake	7.00c. to 8.00c.
Copper, electrolytic	6.75c. to 7.75c.
Copper, casting	6.50c. to 7.50c.
*Copper sheets, hot-rolled	13.87½c.
*High brass sheets	11.25c.
*Seamless brass tubes	13.50c.
*Seamless copper tubes	12.62½c.
*Brass rods	8.75c.
Zinc, slabs	4.37½c. to 4.87½c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	3.75c. to 4.25c.
Lead, bar	5.25c. to 6.25c.
Lead, sheets	7.00c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	16.00c.
Solder, ½ and ½	15.50c. to 16.50c.
Babbitt metal commercial grade	21.00c. to 32.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	30.00c.
Tin, bar	32.00c.
Copper, Lake	6.00c.
Copper, electrolytic	6.00c.
Copper, casting	5.75c.
Zinc, slab	4.25c. to 4.50c.
Lead, American pig	4.25c. to 4.75c.
Lead, bar	7.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	16.50c.
Babbitt metal, high grade	33.50c.
Solder, ½ and ½	18.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.00c.	4.50c.
Copper, hvy. and wire	3.75c.	4.375c.
Copper, light and bottoms	2.875c.	3.625c.
Brass, heavy	1.75c.	2.375c.
Brass, light	1.375c.	1.75c.
Hvy. machine composition	2.75c.	3.125c.
No. 1 yel. brass turnings	2.125c.	2.75c.
No. 1 red brass or compos. turnings	2.375c.	2.75c.
Lead, heavy	2.375c.	2.75c.
Zinc	1.25c.	1.75c.
Cast aluminum	3.75c.	5.00c.
Sheet aluminum	8.50c.	10.00c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(as quoted by distributors)

F.o.b. P'gh mills, 40, 50, 60-ft.	1.40c.
F.o.b. Birmingham, mill lengths	1.65c.
F.o.b. Cleveland	1.40c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.30c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, . . . Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.598c. to 1.698c.
C.i.f. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1/2% Nickel)	$0.25
2100 (1 1/4% Nickel)	0.55
2300 (3 1/2% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill, 1 1/2 in.	3.00c.
1-3/16 to 1 1/2 in.	2.50c.
1-9/16 to 1 7/8 in.	2.35c.
1-15/16 to 2 1/8 in.	2.20c.
2-15/16 to 6 in.	2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.40c.
No. 10, f.o.b. Chicago mill	1.50c.
No. 10, del'd Philadelphia	1.71c.
No. 10, f.o.b. Birmingham	1.55c.
No. 10, c.i.f. Pacific Coast ports	2.02 1/2c.

Hot-Rolled Annealed

No. 10, Pittsburgh	1.55c.
No. 10, Chicago mills	1.65c.
No. 10, Birmingham	1.70c.
No. 10, Pacific Coast ports	2.17 1/2c.
No. 10, wrought iron, Pittsburgh	3.60c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.00c.
No. 24, f.o.b. Chicago mills	2.10c.
No. 24, del'd Philadelphia	2.31c.
No. 24, f.o.b. Birmingham	2.15c.
No. 24, c.i.f. Pacific Coast ports	2.65c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	1.90c.
No. 10 gage, f.o.b. Chicago mills	2.00c.
No. 10 gage, del'd Philadelphia	2.21c.
No. 10 gage, del'd Pacific Coast ports	2.52 1/2c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.30c.
No. 20 gage, f.o.b. Chicago mills	2.40c.
No. 20 gage, del'd Philadelphia	2.61c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.60c. to 2.70c.
No. 24, f.o.b. Chicago mills	2.70c. to 2.80c.
No. 24, del'd Philadelphia	2.91c. to 3.01c.
No. 24, f.o.b. Birmingham	2.75c. to 2.85c.
No. 24, c.i.f. Pacific Coast ports	3.25c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted, 8-lb. coating, f.o.b. Pittsburgh	2.75c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c.
No. 28, Chicago mill	2.40c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.45c.
All widths up to 24 in., Chicago	1.55c.
Cooperage stock, P'gh	1.50c. to 1.55c.
Cooperage stock, Chicago	1.60c. to 1.65c.

Cold-Rolled Strips

F.o.b. Pittsburgh	1.80c. to 2.00c.
F.o.b. Cleveland	1.80c. to 2.00c.
Del'd Chicago	2.20c. to 2.30c.
F.o.b. Worcester	2.00c. to 2.10c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

Extras of 10c. a 100 lb. on mixed and joint carloads, 20c. on pool carloads and 30c. on less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.85
Smooth coated nails	1.85
Galvanized nails	3.35
	Base per 100 Lb.
Smooth annealed wire	$2.25
Smooth galvanized wire	2.60
Polished staples	2.55
Galvanized staples	2.80
Barbed wire, galvanized	2.35
Woven wire fence No. 9 gage, base column, per net ton	$50.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn, and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
1/8	55	33	1/8	+91 1/2	+138
1/4 to 3/8	60 1/2	43	1/4 & 3/8	+11 1/2	+21 1/2
1/2	65 1/2	54	1/2	31 1/2	15
3/4	69	59	3/4	36 1/2	20 1/2
1 to 3	71	62	1 & 1 1/4	39 1/2	25 1/2
			1 1/2	43 1/2	28
			2	41 1/2	26

Lap Weld

2	66	57	2	37	22 1/2
2 1/2 to 6	69 1/2	60 1/2	2 1/2 to 3 1/2	38	25
7 and 8	68	58	4 to 8	40	28 1/2
9 and 10	67	57	9 to 12	38	24 1/2
11 and 12.66		56			

Butt Weld, extra strong, plain ends

1/4	52	37	1/8	+13	+45 1/2
1/4 to 3/8	58	45	1/4 & 3/8	+2 1/2	+34 1/2
1/2	63 1/2	54 1/2	1/2	32 1/2	17 1/2
3/4	68	59	3/4	37 1/2	22 1/2
1 to 3	70	62	1 to 2	43 1/2	29

Lap Weld, extra strong, plain ends

2	65	57	2	40	26
2 1/2 to 6	69	61	2 1/2 to 4.45	1/2	33
7 to 8	68	58	4 1/2 to 6.45		32 1/2
9 and 10	67	57	7 & 8	46	33
11 and 12.	66	56	9 to 12.41	1/2	30

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2 1/4 in.	38	1 1/2 in.	1
2 1/2 in.—2 3/4 in.	46	1 3/4 in.	8
3 in.	52	2 in.—2 1/4 in.	13
3 1/4 in.—4 3/4 in.	54	2 1/2 in.—2 3/4 in.	16
4 in.	57	3 in.	17
4 1/2 in. to 6 in.	46	3 1/4 in. to 3 1/2 in.	18
		4 in.	20
		4 1/2 in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	46
1 1/4 to 1 1/2 in.	53	3 1/4 to 3 1/2 in.	48
1 3/4 in.	37	4 in.	51
2 to 2 1/4 in.	32	4 1/2, 5 and 6 in.	40
2 1/2 to 2 3/4 in.	40		

Hot Rolled

2 and 2 1/4 in.	38	3 1/4 to 3 1/2 in.	54
2 1/2 and 2 3/4 in.	46	4 in.	57
3 in.	52	4 1/2, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	39.00
Light (from rail steel, f.o.b. mill)	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.15
Spikes, 1/2-in. and larger	2.30
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	75
Carriage bolts	75
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.c. and t. square or hex nuts, blank or tapped	75

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh,	75, 25 and 10
Stove bolts in packages, Ch'go,	75, 25 and 10
Stove bolts in pkgs., Cleveland,	75, 25 and 10
Stove bolts in bulk, P'gh	86
Stove bolts in bulk, Chicago	86
Stove bolts in bulk, Cleveland	86
Tire bolts	60 and 10

Discounts of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

(1/2-in. and larger)

	Base per Lb.
F.o.b. Pittsburgh or Cleveland	$3.25
F.o.b. Chicago	3.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 10
F.o.b. Cleveland	70, 10 and 10
F.o.b. Chicago	70, 10 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread 3/8 in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in., inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in., inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in., inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in., inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

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Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$1.75 to $2.00
Foundry, f.o.b. Connellsville Prompt	2.50 to 4.00
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.00 to $1.15
Mine run coking coal, f.o.b. W. Pa.	1.10 to 1.25
Gas coal, ¾-in., f.o.b. Pa. mines	1.25 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.20 to 1.30
Steam slack, f.o.b. W. Pa. mines	0.25 to 0.35
Gas slack, f.o.b. W. Pa. mines	0.35 to 0.45

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.25c
No. 5 industrial fuel oil	2.65c. to 2.75c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.25c.
No. 4 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works: High-heat Duty Brick	Intermediate Duty Brick
Penn.	$35.00	$25.00 to $30.00
Maryland	35.00	25.00 to 30.00
New Jer.	$44.00 to 57.00	
Ohio	35.00	25.00 to 30.00
Kentucky	35.00	25.00 to 30.00
Missouri	35.00	30.00
Illinois	35.00	25.00 to 30.00
Ground fire clay, per ton	6.50	

Chrome Brick

	Per Net Ton
Standard size	$42.50

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$61.50
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chewelah, Wash.	20.90

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$41.40
4-in., del'd Chicago	44.40
6-in., and larger, del'd New York	35.30
4-in., del'd New York	38.30
6-in., and larger, Birm'ham	33.00
4-in., Birmingham	36.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton, f.o.b. Valley furnace:

Basic	$13.50
Bessemer	15.00
Gray Forge	14.50
No. 2 foundry	14.50
No. 3 foundry	14.00
Malleable	14.50
Low phos., copper free	23.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per Gross ton, f.o.b. Pittsburgh district furnace:

Basic	$14.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.00
Bessemer	15.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$15.50
N'th'n No. 1 fdy.	16.00
Malleable, not over 2.26 sil.	15.50
High phosphorus	15.50
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent	23.67
Bess. ferrosil'n, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$15.50
Malleable, f.o.b. Granite City	16.50
Northern No. 2 fdy., del'd St. Louis	17.80
Northern malleable del'd	17.80
Northern basic, del'd	17.80

Freight rates 83c. (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:

*Buffalo, No. 2, del'd east N. J.	$17.41
Buffalo malleable, del'v'd Eastern N. J.	17.91
East Pa. No. 2 fdy.	15.02
East Pa. No. 2X fdy.	15.27

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.11

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala fdy., sil. 1.75 to 2.25	$13.32 to $15.82
Ala. fdy., sil. 2.25 to 2.75	14.32 to 16.07
Tenn. fdy., sil. 1.75 to 2.25	13.82 to 15.82
N'th'n No. 2 foundry	17.01 to 17.59
S'th'n Ohio silvery, 8%	21.02

Freight rates, $2.02 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy. (local delivery)	$15.00
Malleable (local delivery)	15.00
Ohio silvery, 8 per cent	21.75
Stand. low, phos., Valley	23.00

Prices are f.o.b furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.00 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$14.34
East. Pa. No. 2X	14.59
East. Pa. No. 1X	14.84
Basic (del'd east. Pa.)	14.09
Malleable	15.34
Stand. low phos. (f.o.b. east. Pa. furnace)	20.00 to 21.00
Cop. b'r'g' low phos. (f.o.b. furnace)	20.00 to 21.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are delv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No 2 fdy., 1.75 to 2.25 sil.	$11.00 to $12.00
No. 2 soft, 2.25 to 2.75 sil.	11.50 to 12.50
Basic	11.00 to 12.00

NEW ENGLAND

Per gross ton delivered to most New England points:

*Buffalo, sil. 1.75 to 2.25	$19.05
*Buffalo, sil. 2.25 to 2.75	19.30
†Buffalo, sil. 1.75 to 2.25	18.03
†Buffalo, sil. 2.25 to 2.75	18.28
†Ala., sil. 1.75 to 2.25	$15.64 to 16.64
†Ala., sil. 2.25 to 2.75	16.14 to 16.89

Freight rates: $5.05 all rail from Buffalo, and $3.66 to $4.03 rail and water from Buffalo when $1.25 barge and $2.13 to New England freight rate are obtainable; $5.64 rail and water from Alabama to New England seaboard.

* All-rail rate.

† Rail-and-water rate.

CANADA

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	*$68.00
Foreign, 80%, Atlantic or Gulf port, duty paid	61.00

*Contract price; spot quotation $61.

Prices for lots of one carload or more; extras applied on less than carload lots.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$21.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
.4% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$20.50	14%	$23.50
11%	21.00	15%	24.00
12%	21.50	16%	25.00
13%	22.50	17%	26.50

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$18.00	12%	$20.50
7%	18.50	13%	21.50
8%	18.75	14%	22.50
9%	19.00	15%	23.00
10%	19.50	16%	24.00
11%	20.00	17%	25.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to $2.80
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.5% iron	$4.30
Old range, non-Bessemer, 51.50% iron	4.05
Mesabi Bessemer, 51.50% iron	4.05
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, average 68½% iron	9c.
Iron, basic or foundry, Russian, average, 65% iron	8c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	8c.
Manganese, Caucasian, washed 52%	*25c.
Manganese, African, Indian, 50-52%	*21c. to 22c.
Manganese, Brazilian, 46 to 48%	*13c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	$10.00

	Per Gross Ton
Tungsten, domestic scheelite	$8.00 to $10.00
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic seaboard	16.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel 85-5, f.o.b. Kentucky and Illinois mines	$9.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$11.00 to 11.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	$16.00 to 16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium, fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to $10.50
No. 2 heavy melting steel	8.50 to 9.00
No. 2 railroad wrought	9.50 to 10.00
Scrap rails	9.50 to 10.00
Rails 3 ft. and under	10.50 to 11.00
Sheet bar crops, ordinary	10.00 to 10.50
Compressed sheet steel	9.75 to 10.25
Hand bundled sheet steel	8.00 to 8.50
Hvy. steel axle turnings	8.00 to 8.50
Machine shop turnings	6.75 to 7.25
Short shov. steel turnings	6.75 to 7.25
Short mixed borings and turnings	5.75 to 6.25
Cast iron borings	5.75 to 6.25
Cast iron carwheels	8.50 to 9.00
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.00 to 9.50
Railr. knuckles and couplers	10.50 to 11.00
Rail. coil and leaf springs	10.50 to 11.00
Rolled steel wheels	10.50 to 11.00
Low. phos. billet crops	11.00 to 11.50
Low. phos. sheet bar crops	11.00 to 11.50
Low phos. plate scrap	10.00 to 10.50
Low phos. punchings	10.50 to 11.00
Steel car axles	10.50 to 11.00

CHICAGO

Delivred Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$5.50 to $6.00
Shoveling steel	5.50 to 6.00
Hydraulic comp. sheets	4.25 to 4.75
Drop forge flashings	4.00 to 4.50
No. 1 busheling	4.00 to 4.50
Rolled carwheels	7.00 to 7.50
Railroad tires	8.00 to 8.50
Railroad leaf springs	7.75 to 8.25
Axle turnings	4.50 to 5.00
Steel couplers and knuckles	6.50 to 7.00
Coil springs	8.25 to 8.75
Axle turnings (elec. fur.)	5.50 to 6.00
Low phos. punchings	8.50 to 9.00
Low phos. plates, 12 in. and under	8.50 to 9.00
Cast iron borings	3.50 to 4.00
Short shoveling turnings	3.50 to 4.00
Machine shop turnings	3.00 to 3.50
Rerolling rails	7.50 to 8.00
Steel rails, less than 3 ft.	7.50 to 8.00
Steel rails, less than 2 ft.	8.00 to 8.50
Angle bars, steel	7.00 to 7.50
Cast iron carwheels	8.00 to 8.50
Railroad malleable	6.50 to 7.00
Agricultural malleable	5.00 to 5.50

	Per Net Ton
Iron car axles	$11.00 to $11.50
Steel car axles	8.50 to 9.00
No. 1 railroad wrought	4.50 to 5.00
No. 2 railroad wrought	5.00 to 5.50

No. 2 busheling	$2.00 to	$2.50
Locomotive tires, smooth	7.50 to	8.50
Pipe and flues	1.25 to	1.75
No. 1 machinery cast	6.75 to	7.25
Clean automobile cast	7.25 to	7.75
No. 1 railroad cast	6.00 to	6.50
No. 1 agricultural cast	5.75 to	6.25
Stove plate	5.50 to	6.00
Grate bars	6.25 to	6.75
Brake shoes	6.00 to	6.50

* Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel		$7.00
No. 2 heavy melting steel	5.00 to	5.50
No. 1 railroad wrought	7.50 to	8.00
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	5.50 to	6.00
Hydraulic compressed, old	4.00 to	4.50
Machine shop turnings	3.50 to	4.00
Heavy axle turnings	5.50 to	6.00
Cast borings	3.50 to	3.75
Heavy breakable cast		8.50
Stove plate (steel works)	5.50 to	6.00
No. 1 low phos. heavy	10.00 to	10.50
Couplers and knuckles	8.50 to	9.00
Rolled steel wheels	8.50 to	9.00
No. 1 blast furnace	3.50 to	3.75
Spec. iron and steel pipe	6.50 to	7.00
Shafting	12.00 to	13.00
Steel axles	12.00 to	13.00
No. 1 forge fire	5.50 to	6.00
Cast iron carwheels		8.50
No. 1 cast	8.00 to	9.00
Cast borings (chem.)	8.00 to	10.00
Steel rails for rolling	9.00 to	9.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$7.25 to	$7.50
No. 2 heavy melting steel	6.75 to	7.00
Compressed sheet steel	6.75 to	7.25
Light bundled sheet stampings	4.50 to	5.00
Drop forge flashings	6.25 to	6.75
Machine shop turnings	4.25 to	4.75
Short shoveling turnings	5.00 to	5.25
No. 1 busheling	6.25 to	6.75
Steel axle turnings	5.00 to	5.50
Low phos., billet crops	10.00 to	11.00
Cast iron borings	5.00 to	5.25
Mixed borings and short turnings	5.00 to	5.25
No. 2 busheling	5.00 to	5.25
No. 1 cast	7.50 to	8.00
Railroad grate bars	5.00 to	5.50
Stove plate	5.00 to	5.50
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	10.00 to	10.50
Railroad malleable	6.75 to	7.00
Cast iron carwheels		8.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$7.00 to	$7.25
No. 2 heavy melting scrap	5.50 to	6.00
Scrap rails	6.00 to	6.50
New hydraul. comp. sheets	5.50 to	6.00
Old hydraul. comp. sheets		5.00
Drop forge flashings	5.50 to	6.00
No. 1 busheling	5.50 to	6.00
Hvy. steel axle turnings		6.00
Machine shop turnings	4.00 to	4.50
Knuckles and couplers		9.00
Coil and leaf springs		9.00
Rolled steel wheels		9.00
Low phos. billet crops	9.00 to	9.50
Short shov. steel turnings	5.50 to	6.00
Short mixed borings and turnings	3.75 to	4.25
Cast iron borings	3.75 to	4.25
No. 2 busheling	3.50 to	4.00
Steel car axles	10.00 to	11.00
Iron axles	10.00 to	11.00
No. 1 machinery cast	9.50 to	10.00
No. 1 cupola cast	8.50 to	9.00
Stove plate	7.00 to	7.50
Steel rails, 3 ft. and under	9.00 to	10.00
Cast iron carwheels	8.00 to	9.00
Industrial malleable	7.00 to	7.50
Railroad malleable	7.50 to	8.00
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.00 to	$7.50
Scrap steel rails	7.00 to	7.50
Short shoveling turnings		4.00
Stove plate		6.00
Steel axles		9.00
Iron axles		9.00
No. 1 railroad wrought	4.50 to	5.00
Rails for rolling	7.50 to	8.00
No. 1 cast	8.00 to	8.50
Tramcar wheels		8.00
Cast iron borings, chem.		8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$5.50 to	$6.00
No. 1 heavy melting	5.25 to	5.50
No. 2 heavy melting	4.75 to	5.25
No. 1 locomotive tires	5.00 to	5.50
Misc. stand-sec. rails	6.00 to	6.50
Railroad springs	6.25 to	6.75
Bundled sheets	2.00 to	2.50
No. 2 railroad wrought	5.00 to	5.50
No. 1 busheling	3.50 to	4.00
Cast iron borings and shoveling turnings	1.25 to	1.75
Rails for rolling	7.50 to	8.00
Machine shop turnings	1.25 to	1.75
Heavy turnings	3.00 to	3.50
Steel car axles	8.50 to	9.00
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	4.00 to	4.50
No. 1 railroad wrought	3.50 to	4.00
Steel rails less than 3 ft.	8.00 to	8.50
Steel angle bars	6.50 to	7.00
Cast iron carwheels	5.50 to	6.00
No. 1 machinery cast	7.00 to	7.50
Railroad malleable	5.00 to	5.50
No. 1 railroad cast	6.25 to	6.75
Stove plate	6.00 to	6.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 30 lb. and over	$20.00 to	$21.00
Agricult. malleable	4.00 to	4.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.00 to	$3.25
Scrap T rails	2.50 to	2.75
Machine shop turnings	0.80 to	1.00
Cast iron borings		1.05
Bundled skeleton, long	2.00 to	2.10
Forge flashings	3.00 to	3.50
Blast furnace scrap	0.90 to	1.00
Forge scrap	3.00 to	3.25
Shafting	9.50 to	10.00
Steel car axles	9.00 to	9.50
Wrought pipe	4.00 to	4.25
Rails for rolling	4.50 to	5.00
Cast iron borings, chemical	7.00 to	7.25

Per gross ton delivered consumers' yards:

Textile cast	$7.00 to	$7.50
No. 1 machinery cast	7.50 to	8.00
Stove plate	5.00 to	5.25
Railroad malleable	8.00 to	8.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$3.50 to	$5.00
No. 2 heavy melting steel	3.50 to	4.00
Heavy melting steel (yard)		1.50
No. 1 heavy breakable cast	5.00 to	5.25
Stove plate (steel works)	2.50 to	2.90
Machine shop turnings	0.75 to	1.25
Short shoveling turnings	0.75 to	1.25
Cast borings	0.50 to	1.00
No. 1 blast furnace	0.50 to	1.00
Steel car axles	8.00 to	8.50
Spec. iron and steel pipe	$2.50 to	$2.75
Forge fire	2.75 to	3.00
No. 1 railroad wrought	4.00 to	4.50
No. 1 yard wrought long	3.25 to	3.50
Rails for rolling	5.00 to	5.50
No. 1 cast		4.50
No. 2 cast		4.50
Stove plate (foundry)		4.50
Malleable cast (railroad)	4.00 to	4.50
Cast borings (chemical)	6.00 to	6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast		$9.00
No. 1 hvy. cast (cupola size)	7.50 to	8.00
No. 2 cast	4.00 to	4.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$5.25 to	$5.75
Scrap rails for melting	6.00 to	6.50
Loose sheet clippings	1.00 to	1.50
Bundled sheets	2.75 to	4.25
Cast iron borings	3.00 to	3.50
Machine shop turnings	3.00 to	3.50
No. 1 busheling	4.50 to	5.00
No. 2 busheling	2.75 to	3.25
Rails for rolling	6.50 to	7.00
No. 1 locomotive tires	7.00 to	7.50
Short rails	9.00 to	9.50
Cast iron carwheels	6.50 to	7.00
No. 1 machinery cast	6.50 to	7.00
No. 1 railroad cast	6.00 to	6.50
Burnt cast	4.25 to	4.75
Stove plate	4.25 to	4.75
Agricultural malleable	6.75 to	7.25
Railroad malleable	7.00 to	7.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$5.75 to	$6.25
Borings and short turnings	3.75 to	4.25
Long turnings	3.00 to	3.50
No. 1 machinery cast	7.75 to	8.25
Automotive cast	9.00 to	9.50
Hydraul. comp. sheets	5.25 to	5.75
Stove plate	3.00 to	3.50
New No. 1 busheling	4.75 to	5.25
Old No. 2 busheling	3.00 to	3.50
Sheet clippings	2.50 to	3.00
Flashings	3.75 to	4.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast	12.50	10.00
Stove plate	10.00	8.00
Standard carwheels	10.00	8.50
Malleable	10.00	8.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	3.45c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.10c.
Galv. sheets (No. 24), 25 or more bundles	3.35c.
Hot-rolled sheets (No. 10)	2.65c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.61
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list.
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.65
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per keg	2.20

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinfore. bars, billet steel	1.55c. to 1.70c.
Rail steel reinforcement	1.30c. to 1.45c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	3.50c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.80c.
Rivets, structural (keg lots)	2.75c.
Rivets, boiler (keg lots)	2.75c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

NEW YORK

	Base per Lb.
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	5.75c. to 6.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.54c.
Flats and squares	4.04c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	2.75c.
Hot-rolled ann'l'd sheets (No. 24*)	3.25c.
Galvanized sheets (No. 24*)	3.50c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ½ x ⅛ in. and larger	3.40c.
Smooth finish, 1 to 3½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.60
	Per Cent
Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	60.65

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.70c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10) up to and inc. 48 in. wide	3.00c.
over 48 in. wide	3.15c.
Black corrug. sheets (No. 24)	3.75c.
Galv. corrug. sheets	4.05c.
Structural rivets	4.00c.
Boiler rivets	4.00c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 60 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.45c.
*Structural shapes	2.45c.
*Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.35c.
*Steel hoops	3.00c.
*Steel bands, No. 12 to 3/16 in., incl.	2.75c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.15c.
†Galvanized sheets (No. 24)	3.50c.
*Hot-rolled annealed sheets (No. 10)	2.70c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

* Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 1.95c.
Cold-fin. steel bars	2.95c.
Flat rolled steel under ⅛ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.50c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.10

* Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinfore. bars	3.00c.
Rail steel reinfore. bars	3.00c.
Hoops	3.90c.
Bands	3.30c.
Cold-fin. rounds and hex.	3.32c.
Squares and flats	3.82c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	3.55c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.35c.
Galv. sheets (No. 24)	3.75c.
Bands	3.30c.
Hoops	3.55c.
Hot-rolled sheets (No. 10) 48-in. and narrower	3.00c.
Wider than 48-in.	3.25c.
Com. wire nails, base per keg	$2.40
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
*Beams, channels, angles, tees, zees	3.00c.
*H beams and shapes	3.00c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.00c.
Floor plates, diamond pattern	5.25c.
*Bar and bar shapes (mild steel)	2.90c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.40c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, hf. ovals, ovals and bevels	4.15c.
Tire steel, rd. edge 1½ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	3.15c.
One pass cold-rolled sheets No. 24 ga.	3.55c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized sheet sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

* Base prices for 15,000 lb. orders, extras apply for smaller quantities.

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
	Base per Lb.		
Plates and struc. shapes, ¼-in. and heavier	3.15c.	3.30c.	3.00c.
Soft steel bars	3.15c.	3.30c.	3.00c.
*Reinforcing bars	3.00c.	3.00c.	3.00c.
Rot-rolled annealed sheets (No. 24)	3.70c.	4.20c.	4.25c.
Hot - rolled sheets (No. 10)	3.07½c.	3.80c.	3.50c.
Galv sheets (No. 24)	4.30c.	4.50c.	4.75c.
*Struc. rivets, ½ in. and larger	5.75c.	6.00c.	5.25c.
less than 100 lb.			
*Cold finished steel Rounds	5.50c.	5.50c.	5.50c.
Squares and hexagons	6.75c.	6.75c.	6.75c.
Flats	7.25c.	7.25c.	7.25c.
Nails—base per keg less carload:			
Com. 4-60d.	$2.40	$2.40	$2.40
S. or 4-20d.	2.40	2.40	2.40
Finish 6 & 8d.	2.40	2.40	2.40
All others	2.65	2.65	2.65

* Subject to deductions for quantity.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

J. F. Trommer, Inc., 1632 Bushwick Avenue, Brooklyn, brewer, has purchased former plant of Orange Brewery, Orange, N. J., and will modernize and expand for branch plant. Installation will include stainless steel and enameled steel tanks, kettles, mash tubs, etc., chromium plated piping, bottling machinery, conveyors, etc. Power house will be converted for use of oil fuel instead of coal. Cost about $400,000 with machinery. Company will also carry out expansion at Brooklyn plant to cost about $150,000 with equipment.

Manhattan Spring & Couch Co., 197 Mott Street, New York, manufacturer of springs, furniture specialties, has leased factory at Whitestone, L. I., about 53,000 sq. ft. space, and will remove present works on Mott Street, and branch plant on Chrystie Street, New York, to new location and increase capacity.

City Brewing Corpn., 912 Cypress Avenue, Brooklyn, has work under way on expansion and improvements, to include installation of tanks, bottling machinery, mechanical-cooling equipment, conveyors and other equipment. Cost about $300,000 with equipment. Frederick Paulsen is secretary and engineer.

Distributaire, Inc., Brooklyn, has been organized, capital $50,000, by Samson Merriam, 25 Clark Street, city, and S. James Kennedy, 130 Hill Park Avenue, Great Neck, L. I., to manufacture machinery and appliances for air purification, parts, etc.

New York & Richmond Gas Co., 691 Bay Street, St. George, Staten Island, plans construction of new gas holder and distributing lines at Ellingsville, work to begin in summer. Cost over $75,000 with steel tank sections, pipe, etc.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 25 for two motor-driven lathes (Schedule 9924), two motor-driven engine lathes (Schedule 9890), 31 reactors for use with welding sets (Schedule 9938) for Brooklyn Navy Yard.

Noma Electric Corpn., 524 Broadway, New York, manufacturer of electric lighting equipment and sets, will increase capacity of branch plant at Toronto, operated in name of Noma Electric Co. of Canada, Ltd., adding over 5000 sq. ft. floor space. Additional equipment will be installed.

Pompeian Metallizing Co., Inc., New York, has been organized by Melvin Ortner, 344 East Seventy-ninth Street, and Harry Strasser, 1543 Second Avenue, to operate a metal plating works.

Jacob Ruppert Corpn., 1639 Third Avenue, New York, plans call for bids in about 60 days for first unit of new multi-story brewing plant, adjoining present brewery. Other units will be built later. Entire program will cost about $3,500,000 with equipment. Ely Jacques Kahn, 2 Park Avenue, is architect.

Art Aquarium Specialty Co., Inc., Brooklyn, has been organized by Samuel Fischer, 1255 East Thirty-first Street, and Samuel Ginther, 1282 East Tenth Street, both Brooklyn, to manufacture sheet metal products.

Checker Cab Sales Corpn., 1775 Broadway, New York, has arranged for lease of about 70,000 sq. ft. space, of General Cable Corpn., Harrison, N. J., for new taxicab service, repair and parts works.

Board of Education, 22 Valley Road, Montclair, N. J., asks bids until April 29 for equipment for manual training shop, printing department, elementary manual arts, etc. Fred P. Reagle is secretary.

Longport Marine Co., Longport, N. J., has been organized by Richard R. Lovett, Jr., and Edward W. Coppage, Longport, to manufacture motor boats and operate a boat repair works.

Essex Engine & Machine Corpn., 71 Rutgers Street, Belleville, N. J., manufacturer of engines and mechanical equipment, plans alterations and improvements in two-story and basement plant. Cost about $25,000 with equipment.

J. J. Murphy Brewing Co., Trenton, N. J., care of John J. Murphy, Edinburg Road, recently organized with capital of $500,000, has plans for three-story plant, 66 x 125 ft., at North Clinton and Perrine Avenues. Cost about $300,000 with machinery. Waldemar Mortensen, 103 Park Avenue, New York, is architect and engineer.

Hygrade Sylvania Corpn., Salem, Mass., manufacturer of radio tubes and equipment, with branch plants at Emporium and St. Marys, Pa., has leased former one-story plant of Portable Machinery Co., Inc., Clifton, N. J., 46,000 sq. ft. floor space, for new branch factory. W. J. Barkley will be manager.

Harrison Nut & Bolt Co., 207 Railroad Avenue, Harrison, N. J., is increasing production. Company reports orders and shipments in March in excess of any month since last June.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until April 24 for one motor-driven valve grinder (NSAF Req. 5101), 21 valve assemblies (Aero Req. 502-805).

Jacob Hornung Brewing Co., 3111 North Twenty-second Street, Philadelphia, has plans for multi-story addition, including improvements in present plant. Cost over $90,000 with machinery.

Murray & Murray, 109 North Water Street, Philadelphia, lubricating and other oils, plans rebuilding part of bulk oil storage distributing plant in four-story building, destroyed by fire April 6.

John J. Felin & Co., 4142 Germantown Avenue, Philadelphia, meat packers, have asked bids on general contract for one-story addition. Cost over $40,000 with equipment. W. E. S. Dyer, Land Title Building, is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 25 for one motor-driven milling machine and equipment (Schedule 9926), one motor-driven milling machine (Schedule 9927) for Philadelphia Navy Yard.

Columbia Brewing Co., Columbia, Pa., is planning expansion and improvements, including new brewing, bottling and other machinery. Cost about $50,000 with equipment. Philip Knoblauch is head.

Sherman Coal Co., Pottsville, Pa., let contract to Koppers Rheolaveur Co., subsidiary of Koppers Co., Koppers Building, Pittsburgh, for new coal-washing plant. Cost about $250,000 with machinery.

Broadway Products Co., Broadway and Smith Street, Buffalo, will make extensions and improvements in brewing plant, including installation of new equipment. Cost about $50,000 with machinery. George C. Stein is president.

CENTRAL DISTRICT

Pennsylvania Electric Co., Johnstown, Pa., has secured permission to acquire a controlling interest in Clarion River Power Co., Foxburg, Pa., and will carry out expansion program, including extensions in transmission lines.

Dravo Contracting Co., Neville Island, Pittsburgh, plans increased production schedule at branch plant at Wilmington, Del., for construction of floating drydock for Navy Department, to cost $352,680, for which contract was recently secured. It will be 390 ft. long, and 60 ft. wide, equipped with oil engine-generators, pumps, piping, etc., to be used at Naval Operating Base, San Diego, Cal.

Common Council, Cameron, W. Va., has plans for a municipal electric light and power plant to be operated in conjunction with municipal waterworks. Cost over $60,000 with equipment.

United States Engineer Office, Huntington, W. Va., asks bids until April 24 for one gasoline engine-driven, non-reversible haulage engine (Circular 154).

Steinle Brewing & Ice Co., Delphos, Ohio, is planning improvements and expansion at brewing plant. Cost over $60,000 with equipment.

Hopple Mfg. Co., Tiffin, Ohio, manufacturer of radio cabinets and kindred equipment, is planning immediate expansion, with installation of additional equipment. Plant has been closed for several months and will soon resume for order of 75,000 cabinet units, recently received. William H. Hopple is head.

Diamond Water Heater Co., Columbus, Ohio, has been organized by Dwight A. Swisher and Ray A. McFadyen, 21 East State Street, to manufacture water heaters and parts.

Industrial Rayon Corpn., West Ninety-third Street and Walford Avenue, S. W., Cleveland, manufacturer of cellulose rayon products, has let general contract to Hughes-Foulkrod Co., Schaff Building, Philadelphia, for additions to branch mill at Covington, Va. Cost over $100,000 with machinery. Christian, Schwarzenberg & Gaede, 1836 Euclid Avenue, Cleveland, are architects.

Tuscora Brewing Co., Canton, Ohio, recently organized to take over Stark-Tuscarawas Breweries Co., has arranged financing in amount of $500,000, about one-half of fund to be used for addition and modernization in present brewery. New machinery will be installed. Company will be affiliated with Coca-Cola Bottling Co., Canton, which plans erection of new mechanical bottling plant. Edward Rommel is head.

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until April 25 for eight stencil-cutting machines (Circular 516); until May 1, 24 octant assemblies and 24 bubble assemblies (Circular 507), 165 electric and hand-operated starter assemblies (Circular 512), 116 wheel assemblies, 116 axle assemblies, 116 brake assemblies (Circular 506); until May 2, 1044 gages (Circular 521); until May 3, 126 chain hoists, from 1- to 5-ton capacity (Circular 523), 300 trigger motor assemblies, 450 impulse unit end semblies and 24 bubble assemblies (Circular 520).

Board of School Commissioners, 150 North Meridian Street, Indianapolis, asks bids until April 27 for one 300-kw. engine-generator set for technical high school. Bids recently received were rejected.

Muesel Brewing Co., West Jefferson Street, South Bend, Ind., is planning extensions and improvements in three-story plant, including additional equipment. Cost over $75,000 with machinery.

Berghoff Brewing Corpn., Fort Wayne, Ind., will soon begin installation of new mechanical bottling equipment and other machinery for increased capacity. Cost over $80,000.

Michigan Sugar Co., Saginaw, Mich., is planning extensions and improvements in beet sugar mill at Owosso, Mich., idle for five years, with installation of additional machinery. Cost about $75,000 with equipment.

Dailey Liquid Malt Extract Co., 1521 St. John Street, Flint, Mich., recently organized, is planning erection of new multi-story brewery. Cost $160,000 with machinery.

Wohlert Corpn., Lansing, Mich., has been organized by Walter F. Patenge, 700 East Grand River Avenue, and associates, capital $80,000 to manufacture automobile equipment and parts.

Kelvinator Corpn., Detroit, manufacturer of electric refrigerators, has adopted full production schedule at Leonard plant, Grand Rapids, Mich., reinstating about 900 men.

Battle Creek Ice & Cold Storage Co., Battle Creek, Mich., is planning to remodel present building for new brewing plant. Cost about $75,000 with machinery.

SOUTH ATLANTIC

Constructing Quartermaster, Bolling Field, Washington, asks bids until May 4 for one 5-ton capacity incinerator plant.

Virginia Airship Co., Inc., Richmond, Va., Garrett W. Peck, 23 South Boulevard, general manager, recently organized, let general contract to Virginia Bridge & Iron Co., Roanoke, for new aircraft manufacturing plant on local site, comprising two main one-story units, 200 x 750 ft., and 98 x 100 ft. Company plans early purchase of machine tools, bench tools, electrical equipment, conveyors, pumping machinery, etc. Cost over $350,000 with machinery.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 28 for eye bolts, metal grilles and railings, screws, assorted files, chain, wrenches, oil cans, locks, pumps, axes, grease cups, etc. (Schedule 2858).

National Fruit Products Co., Inc., Woodward Building, Washington, has purchased former mill of Delion Tire & Rubber Co., Orangeville, near Baltimore, and will remodel for new bottling, storage and distributing plant. Cost over $45,000 with machinery.

United States Engineer Office, Navy Building, Washington, asks bids until April 25 for three 500-kva. and one 200-kva. transformers with accessories (Circular 107).

E. C. Miller, Albemarle, N. C., is planning to rebuild one-story machine shop and foundry, recently damaged by fire.

AMERICAN
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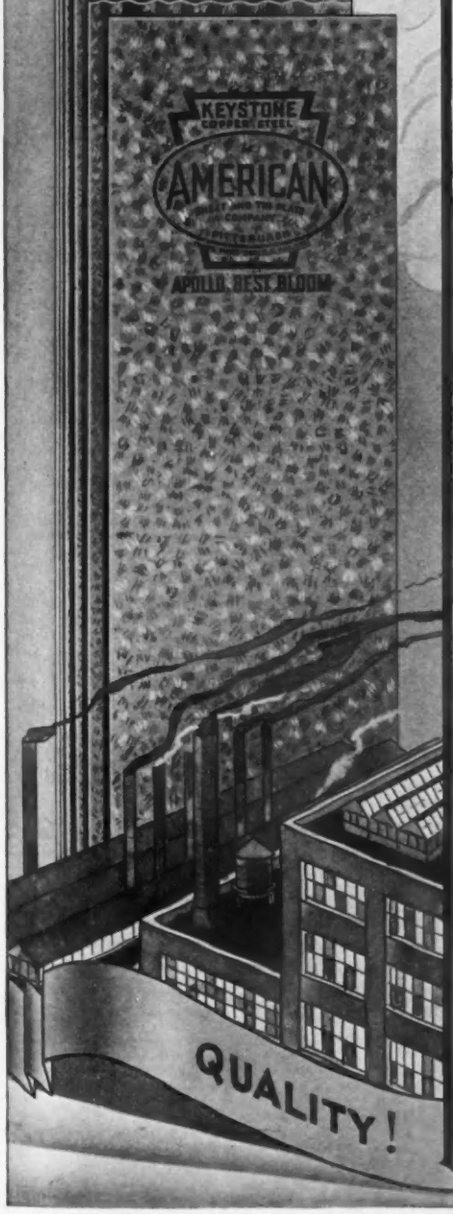
STEEL SHEETS



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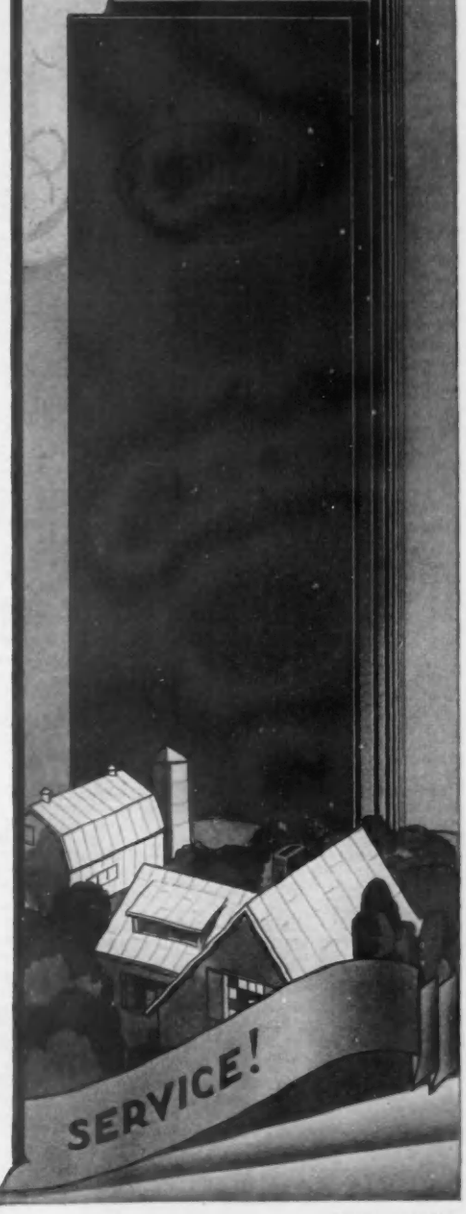

U S STEEL

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GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

KEYSTONE COPPER STEEL AMERICAN SHEET AND TIN PLATE COMPANY

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL & WIRE COMPANY
CARNEGIE STEEL COMPANY

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:
COLUMBIA STEEL COMPANY
CYCLONE FENCE COMPANY
ILLINOIS STEEL COMPANY
NATIONAL TUBE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

OIL WELL SUPPLY COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R.R. COMPANY
UNIVERSAL ATLAS CEMENT COMPANY

Pacific Coast Distributors—Columbia Steel Company, San Francisco, Calif.
Export Distributors—United States Steel Products Company, New York, N. Y.

Gunther Brews, Inc., 1211 South Conklin Street, Baltimore, will build two one-story additions, 52 x 76 ft., and 40 x 85 ft., for expansion in bottling works, storage and distributing plant. Improvements will also be made in main brewery. Cost about $60,000 with equipment. C. H. Osborne, 222 West Franklin Street, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 25 for one crawler type tractor (Schedule 9942) for Pensacola, Fla., Navy Yard; four motor-driven circulating pumps (Schedule 9917), starting motors, generators, distributors, spare parts, etc., for motor boat gasoline engines (Schedule 9945) for Sewalls Point, Va., yard; 48 electric heaters (Schedule 9902) for Brooklyn and Mare Island yards; three automatic screw machines (Schedule 9923) for Newport, R. I., yard; one horizontal turbo blower (Schedule 9943), carbon plate and brushes (Schedule 9905) for Eastern and Western yards; bare resistance wire (Schedule 9896) for Brooklyn, Sewalls Point, Mare Island and Puget Sound yards; 20 fuel oil heaters (Schedule 9900) for Brooklyn and San Diego yards.

SOUTH CENTRAL

Frank Fehr Brewing Co., Fehr Street, Louisville, let general contract to Louisville Bridge & Iron Co., Louisville, for brewhouse addition; will also make improvements in present plant. Cost over $200,000 with equipment. Freyn Engineering Co., Chicago, is architect and engineer.

Common Council, Owenton, Ky., plans installation of elevated steel tank and tower, two pumping units, filtration plant with daily capacity of 250,000 gal., pipe lines, etc., for expansion and improvements in municipal waterworks. Fund of $65,000 has been secured for work.

Common Council, Muscle Shoals, Ala., is planning a municipal electric distributing plant and about 20 miles of transmission line for connection with electric generating plant at Wilson Dam. Cost over $75,000 with equipment.

Town Council, Thomasville, Ala., plans installation of elevated steel tank and tower, capacity about 100,000 gal., pumping machinery, pipe lines and other equipment for waterworks extensions and improvements. Financing has been arranged.

Common Council, Coal Creek, Tenn., is planning municipal airport near proposed power dam, including hangars, repair shop and other field units. Cost over $40,000 with equipment.

MIDDLE WEST

Allied Mills, Inc., 141 West Jackson Boulevard, Chicago, has acquired 3 acre tract at Southgate Industrial Terminal, Norfolk, Va., for new soy bean processing and oil-manufacturing plant. Plans are being drawn for two-story and basement processing unit, 40 x 100 ft., and two-story and basement storage and distributing plant, 70 x 102 ft., with storage elevator, power house and other mechanical structures. Machinery installation will include crushing equipment, expellers, filtration and clarifying machinery, conveying and other equipment. Cost over $350,000 with equipment.

Chicago Carton Co., 4433 Ogden Avenue, Chicago, manufacturer of corrugated and other paper containers, has plans for new two-story and basement factory, 260 x 500 ft. Cost about $300,000 with machinery. A. Epstein, 2001 West Pershing Road, is architect and engineer.

Screw Conveyor Corpn., 105 West Madison Street, Chicago, has been organized by Joseph L. Kozak and Russell B. Mass, to manufacture conveying and kindred mechanical equipment.

Midwest-Timmerman Co., 712 Iowa Street, Davenport, Iowa, radio equipment and electrical specialties, will remodel building for new machine shop, to include installation of lathes, drill press, grinders and other tools.

Grant Otto Appliance Co., 147th Street and Page Avenue, Harvey, Ill., manufacturer of mechanical specialties, plans rebuilding part of plant recently destroyed by fire. Loss over $70,000 with equipment.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Francis E. Warren, Wyo., asks bids until April 24 for two automatic stokers (Circular 64).

Rockford Brewing Corpn., 120 Prairie Avenue, Rockford, Ill., is planning improvements and modernization, including additional equipment. Cost over $50,000 with machinery.

St. Cloud Brewing Co., St. Cloud, Minn., recently chartered by John P. J. Dolan, 1508 Pioneer Building, and associates, is planning expansion and improvements, including installation of bottling machinery, brewhouse equipment, conveyors, etc. Equipment installation is estimated at $50,000.

Farmers National Grain Co., 343 South Dearborn Street, Chicago, has acquired property on Illinois River, Peoria, Ill., for new grain handling plant from trucks to barges, to be operated in conjunction with present grain elevator at same location. Conveying, loading and other mechanical-handling equipment will be installed. Cost over $65,000.

Northern Brewing Co., Eighth and Catlin Streets, Superior, Wis., will carry out expansion and improvements, including bottling machinery, vats, kettles and other equipment. Cost about $45,000.

Milwaukee Board of Public Works, City Hall, Milwaukee, has plans for new filtration station for municipal waterworks system, to cost $4,500,000, with daily capacity of 200,000,000 gal. Request for loan from Reconstruction Finance Corpn. is pending in Common Council. Joseph P. Schwada is city engineer.

Wisconsin Motor Co., 1910 South Fifty-third Street, Milwaukee, manufacturer of internal combustion engines from 1½ to 150 hp., has reorganized financial structure and changed corporate title to Wisconsin Motor Corpn.

NEW ENGLAND

Croft Brewing Co., Boston, recently organized, has taken over former Highland Spring Brewery, Roxbury Crossing, and will expand and remodel. Initial capacity of 250,000 bbl. a year will be provided, to be increased to 350,000 bbl. later. Cost over $200,000 with machinery. Company has arranged financing to exceed $1,500,000. Walter J. Croft is vice-president and production manager. John F. Hunt & Co., 545 West Twentieth Street, New York, are architects and engineers.

State Welding Co., Inc., Providence, R. I., has been organized by Fred C. Martin, 74 Brown Street, Pawtucket, R. I., and Everett A. Kingsley, Providence, to operate a welding and mechanical parts manufacturing works.

Algonquin Brewing Co., Inc., 224 Hallam Street, Bridgeport, Conn., operating former plant of Home Brewing Co., is planning expansion and modernization, including equipment. Cost over $85,000 with machinery. E. B. Merritt is head.

Shawmut Automotive & Battery Mfg. Corpn., Boston, recently formed by Augustus J. Migell, 17 Grant Place, Dorchester, Mass., has leased space in building at 314-18-20 Dover Street, for manufacture of electric storage batteries and automobile equipment.

American Telector Corpn., New Haven, Conn., has been organized by Eugene D. Stirlen, 600 Prospect Street, and Franklin Ray, 1145 Chapel Street, capital $500,000, to manufacture special electrical equipment and devices.

SOUTHWEST

Parsons Electric Co., 2010 Grand Avenue, Kansas City, Mo., has been organized by R. E. and T. T. Parsons, to manufacture electrical appliances and equipment.

Board of Water Commissioners, City Hall, St. Louis, is planning extensions and improvements in water supply system, including pipe lines and equipment. Cost over $150,000.

St. Louis-San Francisco Railroad Co., Frisco Building, St. Louis, is considering rebuilding part of engine house and repair shops at Oklahoma City recently destroyed by fire. Loss over $150,000 with equipment.

J. A. Vaughan Mfg. Co., Tulsa, Okla., recently organized to manufacture spraying devices and equipment, will begin production at local plant for initial output of about 10,000 spraying units daily.

County Dairy Co., Clayton, Mo., plans installation of processing equipment, pumping machinery, refrigerating and other equipment in new one-story plant, 100 x 160 ft. Cost about $65,000 with equipment. Robert E. Denny, Clayton, is architect.

City Council, Plainview, Tex., has been authorized to arrange bond issue of $450,000, fund to be used for a municipal electric light and power plant.

Missouri-Kansas-Texas Railway Co., St. Louis, has reopened locomotive and car repair shops at Sedalia, Mo., Parsons, Kan., and Waco, Tex., following shut down for more than a year, reinstating over 700 men.

Littlefield Cotton Oil Co., Littlefield, Tex., affiliated with Abilene Cotton Oil Co., Abilene, Tex., is planning new cottonseed oil mill on 10-acre tract. Cost over $50,000 with machinery.

City Council, Cushing, Okla., plans construction of an electrical distributing system in connection with acquisition of local electric light and power plant, and operation in future as municipal property. Improvements will be made in plant. Fund of $300,000 is being arranged for project.

PACIFIC COAST

Boyertown Burial Casket Co., 715 South Johnston Street, Los Angeles, has plans for new two-story L-shaped plant, 60 x 100 x 343 ft. Cost about $75,000 with equipment. John M. Cooper, Rives-Strong Building, is architect. Headquarters are at Boyertown, Pa.

Fredericksburg Brewery, San Jose, Cal., care of Charles Colpe, Russ Building, San Francisco, has plans for extensions and improvements, including installation of new machinery. Cost about $50,000 with equipment. R. McGlenn, Russ Building, is architect and engineer.

Vernon Brewing Co., Vernon, Cal., F. A. Linck, 917½ Dos Robles Place, Alhambra, Cal., engineer, has let general contract to Pennsylvania Iron & Steel Co., Los Angeles, for four-story plant at Vernon, with one and one-half story unit adjoining. Battery of 46 steel tanks will be installed. Cost about $175,000 with equipment.

Visalia Citizens' League, Visalia, Cal., A. C. Williams, president, is at head of project to establish new municipal electric light and power plant, using Diesel engine units. Cost over $70,000 with equipment. W. R. Bailey and M. J. Lally are head of committee in charge.

Sectional Interlocking Concrete Pipe Mfg. Co., Seattle, care of Dore, Beeler & Havens, Smith Tower Building, recently organized by J. H. Darrow, Seattle, and associates, plans erection of new plant for manufacture of reinforced concrete pipe. Cost over $40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 25 for one hydraulic testing machine (Schedule 9939) for Mare Island Navy Yard; until May 2, 13 centrifugal ventilating sets (Schedule 9925) for Puget Sound yard.

Fresno Brewing Co., 100 M Street, Fresno, Cal., has plans for extensions and improvements, including additional equipment. Cost about $75,000 with machinery. Charles Butner, Cory Building, is architect.

Los Angeles County Water District No. 20, Los Angeles, care of W. Davidson, Hall of Records, County mechanical engineer, plans installation of two 225,000-gal. capacity elevated steel tanks and towers, pumping machinery and other equipment, including 30 miles pipe lines, for new water system at Florence and vicinity. Cost about $350,000 with equipment.

Seattle Gas Co., Seattle, is planning extensions and improvements in artificial gas plant at Lake Union, including installation of new equipment. Cost over $80,000 with machinery.

Western Containers, Inc., 5053 East Marginal Way, Seattle, manufacturer of corrugated boxes and containers, has leased for new plant one-story factory, 150 x 246 ft., to be erected by Ladd Estate, 506 Hoge Building. It will cost about $75,000, of which approximately one-half will be expanded for equipment. Austin Co., Dexter-Horton Building, is architect and engineer.

FOREIGN

Swedish State Railroads, Stockholm, Sweden, is planning electrification of west coast line from Goteborg to Malmo at cost of 27,150,000 kroner (about $7,276,200), scheduling completion in 1936. Of sum noted, about 11,800,000 kroner will be used for overhead and other power transmission lines with steel towers, and 8,800,000 kroner for 46 new locomotives and accessory rolling stock.

Ministry of Public Works, Madrid, Spain, is planning Government airport at Seville, with hangars, repair and reconditioning shops, oil storage and distributing plants, and other units. Cost over $350,000 with equipment.

Fukushima Cotton Spinning Co., Yokohama, Japan, is organizing a new subsidiary, capitalized at 7,000,000 yen (about $1,470,000), to erect a new cellulose rayon mill at Bofucho, Yamaguchi Prefecture. Initial unit will cost over $500,000 with machinery.

Cerveceria Cuauhtemoc, Ltd., Monterey, Mexico, brewer, is considering new branch plant in southern California, near Mexican boundary line. Initial unit will cost over $400,000 with machinery. J. E. Zanbarano is vice-president.

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EVERYWHERE you look, steel meets your gaze. Thanks to steel, economy, permanence, extra dependability and safety are the order of the day. Steel, with its many uses, is the modern way to make old products new—new products better. If you're considering a new roof for a building or a new design for a product, by all means investigate steel. Its adaptability, workability, fire safety and low depreciation cost deserve your consideration. And when it comes to quality and service in the steel you buy, remember Granite City Steel Company—15 minutes from Saint Louis, served by 19 railroads and the Mississippi River—better service to the Mississippi Valley, the West and the Southwest.

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GRANITE CITY STEEL CO

GRANITE CITY, ILLINOIS

What the Machine Has Done to Us

(*Continued from Page 627*)

and its occupations, that fundamental changes have taken place.

The changing rate of growth in numbers indicates an approach to a limit beyond which there will be no further increase in numbers. Rapid decrease in illiteracy and increase in those attending school suggests a development in the average quality of the population if not in its quantity. Markets may continue to expand through a higher per capita consumption.

Relative Dependency

The changing age distribution tends to reduce the number of dependents per person gainfully occupied, while the advance of medical science and the amelioration of working and living conditions has prolonged the useful life of the individual; both factors increase the relative real reward under normal conditions. In periods of severe depression, on the other hand, widespread unemployment abnormally increases the proportion of dependents both within the family group and within the community. At such times the apparent reward of those who remain gainfully occupied is sharply reduced by the necessity for dividing a much larger proportion among dependents.

The elimination of child labor is probably the greatest single benefit that mechanization of industry has bestowed on mankind. The emancipation of women from physical toil is scarcely less important.

A New Aspect of the Density of Occupation

The shift from homemade goods to factory products has provided employment for millions. No estimate of the density of employment is of significance unless it takes into account the numbers engaged in useful occupations for which they are not paid in money. To this category might well be added those engaged in preparing themselves for future and greater usefulness to society. Available data indicates that the latest half-century has marked an average gain in the density of useful occupations with respect to the numbers available for such occupation, from 80 per cent to 95 per cent. The gain has been chiefly from the ranks of idle young people neither at school nor at work and from the ranks of older dependents broken in health by drudgery of their earlier years.

Of especial interest is the evident fact that those displaced from certain occupations have more than been absorbed by others, thus resulting in a net gain in total occupation.

Indicated Limits of Growth

Numbers of wage earners engaged in the manufacturing industries have increased at a rapid rate, but a retardation of rate in more recent years suggests an approach to an upper limit of growth. Such a limit of growth suggests an equilibrium in distribution of occupations in a population approaching a limit of growth rather than a forecast of widespread unemployment.

Aggregate wages paid out by manufacturing industry exhibit a more rapid rate of growth than do numbers of wage earners—that is, wage per wage earner has rapidly increased. The rate of increase has been substantially uniform throughout the period, but exhibits a remarkable offset between 1914 and 1919.

The Role of the Price System

An interpretation of the changes in the pecuniary magnitudes of either wages or production can be accomplished only with reference to the changing price level. Prices are the common denominator by means of which we are able to relate dissimilar things and to interpret data expressed in dollars. They are the means, also, by which we can compare and connect changes and relations in one time period with changes and relations in other time periods. Major wars have a profoundly disturbing effect on the price structure. Prosperity may occur in periods of declining commodity prices; depressions in periods of rising commodity prices.

Wholesale commodity prices govern the movements of industry and trade, but the family as a unit is concerned with the prices of goods, services and rights at retail, that is, the cost of living.

Real Wages

The real wage computed by dividing the money wage by the cost of living has progressively advanced throughout the period of mechanization in the manufacturing industries. The increase in intangible additions to the wage such as leisure time, amelioration of living and working conditions, opportunities for educational and cultural advance, public health service, and so on, has probably been even greater than the advances that can be reduced to figures.

Mechanization of the manufacturing industries has made available in abundance to the average wage earner thousands of comforts and satisfactions which otherwise would not have been available to any one at any price.

A most abrupt increase in the relative real wage of those engaged in the manufacturing industries occurred about 1920, disrupting a long-established equilibrium among occupations. Every wage earner is both producer and consumer and real wage is measured by the balance between income and outgo. Thus an abrupt increase for one group is offset by an equally abrupt decrease for one or more other groups. The immediate effect is to deprive these other groups of the products they can no longer afford to buy; the resultant effect, through consequent restriction of market, is a contribution to disemployment in the industry whose real wage has become disproportionately higher.

The Transfer of Skill and of Ownership

The progress of mechanization in the manufacturing industries has promoted the transfer of skill from the man to the machine and also promoted the transfer of the ownership of the means of production to proprietors other than the wage earner. The workman has advanced from the crude fabrication of his own needs with his own hands. He now earns money with which to buy the more elaborate products of unknown hands, each a specialist in the fabrication of some one product. Thus he may enjoy many things he has not the ability himself to produce.

The application of power is an approximate quantitative measure of the progress and degree of both the transfer of skill and the transfer of ownership. The application of power has increased at a rate more rapid than the number of wage earners so that power per wage earner and investment per wage earner have also increased. The period of most rapid advance has, however, been during the decade of the 1890's and not, as generally believed, during the 1920's. The indicated trends suggest a retardation of rate and approach to a maximum, more nearly in the case of investment than in the case of power.

The Influences Controlling Investment

Investment of capital is influenced by a consideration of prospective income from such investment. Income from invested capital has its relative real value just as wages have a relative real value measured by their purchasing power. Income from invested capital is subject to a greater diversity among its recipients than are wages. Income is less flexible than wages because it is subjected to the influences of long-time trends rather than to the influences of current fluctuations. Relative real value of incomes tends to be disproportionately high in periods of declining commodity prices and disproportionately low in periods of rising commodity prices.

Capital investment is influenced also by considerations of safety, that is, the ultimate return of the principal itself. Long-term investments, such as mortgage bonds secured by real estate, placed in periods of high commodity prices, become burdensome to the borrower in succeeding periods of lower commodity prices.

Vastly more burdensome, however, is the situation that arises when the

(*Concluded on Advertising Page 12*)

SAVE...WITH THE HELP OF NICKEL

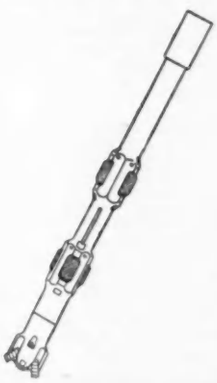
GAIN THE ECONOMY OF IMPROVED PERFORMANCE AND LONGER LIFE FOR YOUR MACHINERY AND EQUIPMENT

IN THE WAR against the ravages of wear, corrosion, heat, fatigue and shock, nickel can be used as a valuable ally.

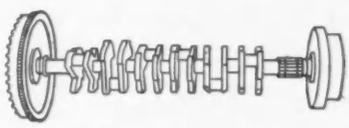
Nickel alloys are uniform in properties and dependable in performance. They permit economy in design, as due to their greater strength, toughness and wear-resistance, smaller sections often can be used.

Other savings are attainable through the ease with which nickel alloys respond to ordinary manufacturing operations. Often these savings outweigh the slight initial difference in material cost.

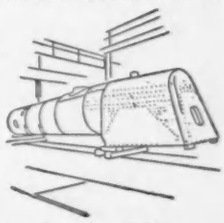
With nickel alloys, the particular properties desired can be duplicated regularly in commercial production. This assures more reliable performance of the finished product, and reduces rejections in the manufacturing process.



Nickel alloy steels are commercially the most important of the useful nickel alloys. They have been cast, forged and rolled on a production basis for more than forty years. Service records established during this period by nickel alloy steel parts are eloquent testimony to their inherent reliability.

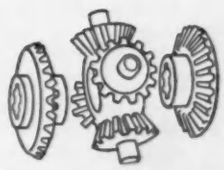


Commercial nickel alloy steels are regularly produced by all alloy steel mills and leading foundries. Rolled forms are carried in stock by warehouses in important industrial centers. These producers and vendors will welcome the opportunity to assist in the selection of compositions and treatments best suited to meet your particular requirements.



If the improved properties and dependable performance of nickel alloy steels are of interest to you, we shall be glad to put you in touch with established sources of supply.

Our engineers will also be glad to assist you to select suitable compositions and appropriate heat treatments for your particular applications.



Send for Bulletin Number 3 "Heat Treatment and Applications of Nickel and Nickel Chromium Steels."

Typical Uses

Some important applications of nickel alloy steels in various industries are: automobile, aircraft and motorcycle construction, locomotive and railroad car parts, mining, excavating, milling, lumber mill and power machinery, machine tools, steam and hydraulic turbines, electrical machinery, marine shafting, die blocks, ordnance, oil field tools.

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(*Concluded from Advertising Page* 10)

borrower actually receives but a small part of the proceeds of the loan whether it be in the form of bonds or of stocks. Thus when we read in the current news of a stock issue which was acquired at $10 a share and resold to the public at $45 per share we must realize that an impossible situation has been created. No degree of technical expertness or of managerial skill could possibly achieve $45 earnings on a $10 investment. This is not a case of too rapid technological development nor of over-expansion of productive capacity. This is not a case of too much brick and steel; it is a case of too much water and bad faith.

Relations Between Value and Physical Volume

The output of manufacturing industry has two aspects—the one with respect to money value and the other with respect to physical volume. The relations between these two are at times violently disrupted by convulsive fluctuations in prices.

Output must be considered in the aggregate and also on a per wage earner and a per horsepower basis owing to the wide changes in numbers of wage earners and of horsepower capacity provided.

The final curves of growth and trend of horsepower per wage earner for each unit of volume output per wage earner suggest "S" curve characteristics as might be expected from the knowledge that these final curves are composites of factors all of which have similar characteristics. Present indications suggest that horsepower per unit of physical volume is closely approaching a maximum if it has not indeed already passed that point. Subsequently available data or unforeseen developments may change the aspect of the immediate or near future situation.

The Wage Earner's Real Reward with Respect to Productivity

Any real advantage that may have come to the wage earner through mechanization or coincident with mechanization must be measured in terms of his real reward with respect to his productivity. Real reward is the sum total of human satisfactions his wage enables him to command.

The apparently reduced real reward of the wage earner per unit of physical productivity does not mean that increased effort for the same result is demanded of him. It means that the increase in productivity that has come with mechanization has made more goods available to the whole community with a large reduction in aggregate effort.

Dollar wage per dollar value of product and per dollar value added by manufacture have varied surprisingly little throughout the whole history of the industrial development of the nation. The relation has been relatively little disturbed by the most stupendous changes in social, political and economic background.

Expansion of Markets for Manufactured Goods

Diversion of part of the proceeds of production to items other than wages has not contributed to disemployment nor to reduction of real wages. The expansion of markets following the trend toward the purchase of manufactured goods has more than absorbed the necessary diversion.

Hours of Labor

Average hours of labor have progressively been reduced at a fairly uniform rate, now apparently approaching its horizontal limit. Average hourly rates of wage have followed the general course of average annual wages except that with the shortening of hours the hourly rate has advanced more rapidly than the annual rate.

No arbitrary and drastic reduction of the hours in the nominal standard work week holds out any hope of real relief from unemployment. We can no more legislate away the operation of economic law than can we influence the operation of physical laws.

The Road to Relief

Relief from depression for the people as a whole lies in no magic formula, in no single panacea. It lies in a multitude of readjustments. The multitude of factors which has been violently disturbed from equilibrium must be returned not to former condition but to former balance. The broad outline of that balance is indicated by the relations which have been developing since the dawn of civilization. The trend of those relations is revealed by the study of their course through the century of the development of our modern manufacturing system.

Author's note:—Grateful acknowledgment is due John H. Van Deventer, Editor of The Iron Age; L. W. Moffett, Washington representative of The Iron Age; Dr. Lionel D. Edie, Mayflower Associates; and to Messrs. Kuvin and Frankel of the National Industrial Conference Board, Inc., for their inspiration and cooperation in the preparation of this study.

The drawing of specifications for refractories for high-temperature insulation and the development of standard methods of testing in that connection will be undertaken by Committee C-8 on refractories of the American Society for Testing Materials, according to the decision of the committee at a recent meeting in Pittsburgh. Insulating materials that have been used to face the flame, put together even without a coating of refractory cement, will probably come under the investigation of the committee, as well as products reported to save operating costs in intermittently operated furnaces.

Trade Notes

Coppus Engineering Corpn., Worcester, Mass., has appointed Cooper Pogue, Chamber of Commerce Building, Cincinnati, as sales representative in the Cincinnati district for its line of Coppus-Annis dry type air filters for ventilating and industrial purposes.

Centrifugal Pumps.—Chain Belt Co., Milwaukee. Leaflet giving capacities and other engineering information about a line of self-priming pumps capable of handling water carrying gravel and other solids for lifts up to 25 ft. and capacities up to 20,400 gal. per hr.

Meyers Engineering Equipment Co., 401 South Twelfth Street, St. Louis, with branch office at Eldorado, Ill., has been organized as engineering representative, specializing in air conditioning, heating, ventilating, drying and humidifying.

Northwest Engineering Co., 28 East Jackson Boulevard, Chicago, excavating and material handling equipment, has appointed the following distributers: J. C. Louis, Inc., Baltimore, in Maryland and Washington territory; Blaisdell & Folz Equipment Co., Cincinnati, in Cincinnati district, and C. J. Burke, Detroit, in eastern and southern Michigan.

Boiler Tubes.—Steel & Tubes, Inc., Cleveland. Leaflet covering Electrunite tubing made by this subsidiary of the Republic Steel Corpn. out of strip steel and rust-resisting Toncan metal by electrical resistance welding under the Johnston patents.

Smith Booth Usher Co., Los Angeles dealer in machine tools, pumps, engines, compressors, construction equipment, pipe, valves and fittings, is occupying new quarters at 2001 Santa Fe Avenue, that city, with ample ground floor display space.

Kalman Steel Corpn., New York, has removed its office to 25 Broadway.

Ross S. Fleming, 2401 Chestnut Street, Philadelphia, has been appointed distributer for Osborn Mfg. Co., tramrail division, Cleveland.

Harrison Sales Co., Seattle, Wash., distributer of Barber-Colman electric system of temperature control in Washington and Oregon, has appointed a representative in Portland, Ore., to handle this line.

Russell, Burdsall & Ward Bolt & Nut Co. has moved its Western sales office from 310 South Michigan Avenue, Chicago, to its Western plant at Rock Falls, Ill.

John A. Roebling's Sons Co. of New York has moved its offices from 83 Liberty Street to 107 Liberty Street.

H. E. Fenner, for many years general service manager of the United American Bosch Corpn., Springfield, Mass., has been placed in charge of the distribution of the portable electric tools brought out recently by the corporation.

Buffalo Brake Beam Co. has removed its offices to 92 Liberty Street, New York.

H. O. Swoboda, Inc., 3530 Forbes Street, Pittsburgh, consulting engineer, has appointed E. H. Merrick, 3020 Coleridge Road, Cleveland Heights, as its exclusive sales agent in northern Ohio for continuous electric heat-treating furnaces and bare electric immersion heaters for viscous materials.

Sterling-French Machinery Co., New Center Building, Detroit, has been appointed to represent Sundstrand Machine Co., Rockford, Ill., in the Detroit territory and Ontario. D. B. Burleigh, formerly vice-president and sales manager of the Sundstrand company, will handle the Sundstrand line for the Sterling-French organization.

Paul F. Hermann Co., 1910 Beechwood Boulevard, Pittsburgh, has taken over the exclusive representation of Federal Products Corpn., Providence, R. I., for western Pennsylvania and West Virginia for precision dial indicators and gages.

Northern Equipment Co., Erie, Pa., has appointed as sales representatives I. C. DeHaven Engineering Co., Circle Tower Building, Indianapolis, for northern Indiana excluding Porter, Lake, LaPorte, St. Joseph and Elkhart counties, and Economy Equipment Co., Roosevelt Building, St. Louis, for southern Illinois.